The Department of Defense

DoD DEPARTMENTS/AGENCIES:

AD-A210 042

Department of the Army

Department of the Navy

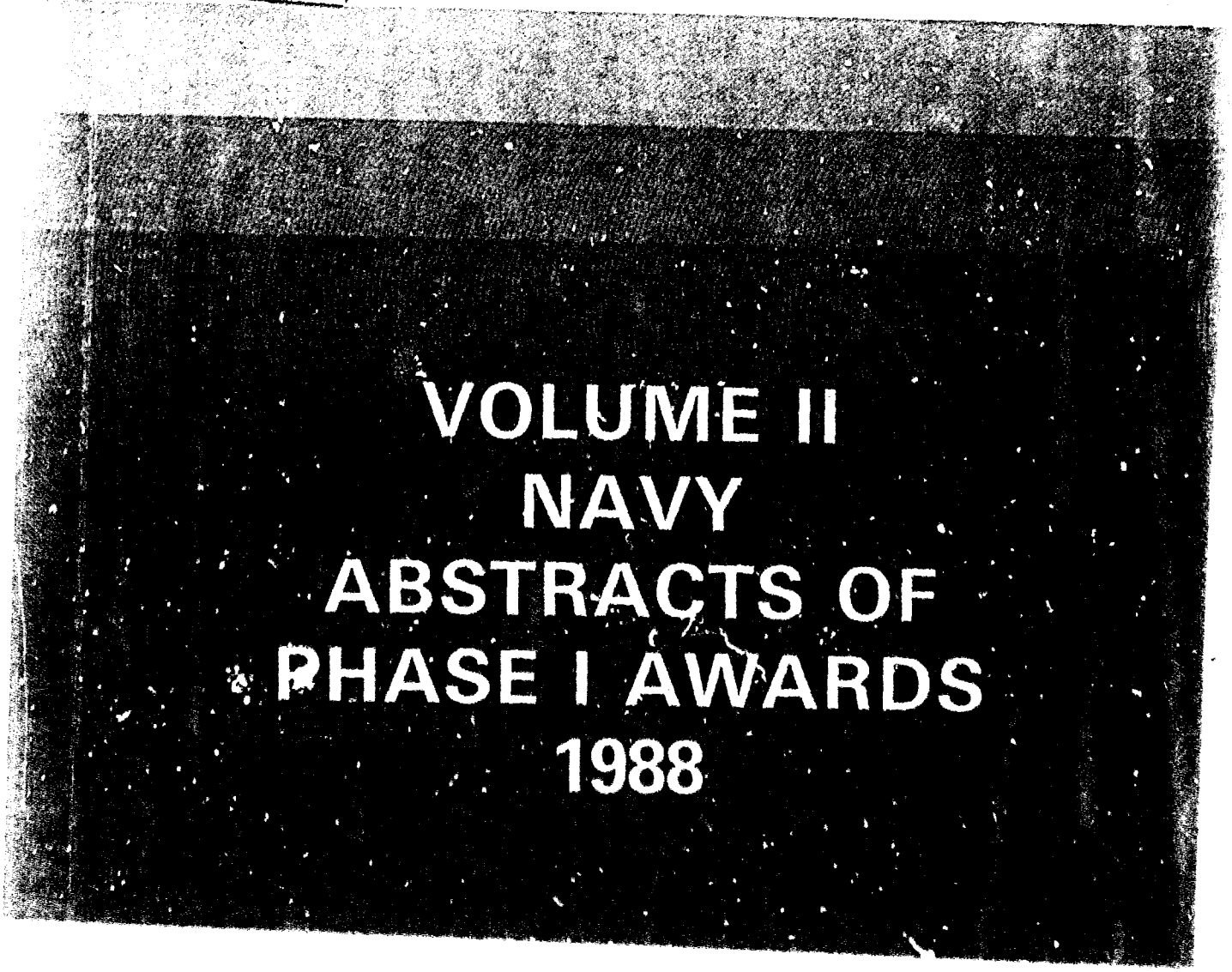
Department of the Air Force

DARPA Defense Advanced Research Projects Agency

Defense Nuclear Agency

Strategic Defen Initiative Organization

DEFENSE SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR)



VOLUME II

NAVY PROJECTS

ABSTRACTS OF PHASE I AWARDS

FROM

FY 1988 SBIR SOLICITATION

May 1989

PREFACE

On September 1, 1988 Secretary of Defense Frank C. Carlucci announced the selection of small business firms proposals under Phase I of the Fiscal Year (FY) 1988 Department of Defense (DoD) Small Business Innovation Research (SBIR) Program to be funded upon successful completion of contract negotiations.

The selection of proposals for funding was made from proposals received by the Military Departments, the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency (DNA), and the Strategic Defense Initiative Organization (SDIO) in response to the FY 1988 solicitation distributed on October 1, 1987 with a closing date of January 8, 1988.

FY 1988 Program

	Number of Topics	Proposals Received	Phase I Awards
Army	234	2426	214
Navy	250	2022	249
Air Force	242	2740	375
DARPA	38	555	61
DNA	8	187	19
SDIO	15	730	138
	787	8660	1056

In order to make information available on the technical content of the Phase I projects supported by the Department of Defense SBIR Program, this report presents, in four volumes, the abstracts of those proposals which have resulted in contract awards.

This is Volume II which contains abstracts and contacts for the 249 Phase I projects funded by the Navy from the FY 1988 SBIR solicitation. Projects funded by other Department of Defense components are published in separate volumes as follows:

- Volume I - Army Projects (Pages 1 - 130)
- Volume III - Air Force Projects (Pages 290 - 525)
- Volume IV - DARPA, DNA and SDIO Projects (Pages 526 - 679)

Venture capital and large industrial firms that may have an interest in the research described in the abstracts in this publication are encouraged to contact the SBIR firm whose name and address is shown.

INTRODUCTION

On July 22, 1982 the President signed the "Small Business Innovation Development Act of 1982" (Public Law 97-219). This law became effective October 1, 1982 and was designed to give small high technology firms a greater share of Federal R&D contract awards.

The SBIR Program consists of three distinct phases. Under Phase I, DoD Components make awards to small businesses, typically of one-half to one man-year effort over a period generally not to exceed six months, subject to negotiation. Phase I is to determine, insofar as possible, the scientific or technical merit and feasibility of ideas or concepts submitted in response to SBIR topics. All DoD topics address specific R&D needs to improve our defense posture. Proposals selected for contract award are those which contain an approach or idea that holds promise to provide an answer to the specific problem addressed in the topic. The successful completion of Phase I is a pre-requisite for further DoD support in Phase II.

Phase II awards will be made only to firms on the basis of results from the Phase I effort, and the scientific and technical merit of the Phase II proposal. In addition, proposals which identify a follow-on Phase III funding commitment from non-Federal sources will be given special consideration. Phase II awards will typically cover two to five man-years of effort over a period generally not to exceed 24 months, also subject to negotiation. The number of Phase II awards will depend upon the success rate of the Phase I effort and availability of funds. Phase II is the principal research or research and development effort, and will require a more comprehensive proposal which outlines the intended effort in detail.

Phase III is expected to involve private-sector investment and support for any necessary development that will bring an innovation to the marketplace. Also, under Phase III, DoD may award follow-on contracts not funded by the SBIR Program for products or processes meeting DoD mission needs.

Selection Criteria

Phase I proposals received in each topic area in the DoD solicitation brochure are evaluated on a competitive basis in the organization which generated the topic, by scientists and engineers knowledgeable in that area and in accordance with the following criteria:

1. The scientific/technical quality of the research proposal and its relevance to the topic description, with special emphasis on its innovation and originality.

2. Qualifications of the principal investigator, other key staff, and consultants, if any, and the adequacy of available or obtainable instrumentation and facilities.

3. Anticipated benefits of the research to the total DoD research and development effort.

4. Adequacy of the Phase I proposed effort to show progress toward demonstrating the feasibility of the concept.

The Act mandates that all Federal Agencies establish an SBIR program if their FY 1982 extramural budgets for R&D exceeded a threshold figure of $100 million. Beginning in FY 1983, DoD must make available the following percentages of its extramural R&D budget for this program:

	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987	FY 1988
Percentage	0.1	0.3	0.5	1.0	1.25	1.25
Estimated Dollars	16.7M	43M	79M	150M	202M	221M
Actual Awarded Dollars	20.6M	44.6M	78.2M	150.7M	202M	221M

FY 1983 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	182	1121	98	43
Navy	131	944	66	47
Air Force	75	496	99	49
DARPA	8	128	12	7
DNA	10	88	8	2
	406	2777	283	148

1984 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	111	758	81	35
Navy	146	859	99	52
Air Force	283	1208	162	73
DARPA	17	107	15	7
DNA	8	80	12	1
	565	3012	369	168

FY 1985 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	111	808	124	68
Navy	138	851	110	62
Air Force	218	1306	249	120
DARPA	17	130	13	6
DNA	7	95	18	6
SDIO	18	415	36	16
	509	3605	550	278

FY 1986 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	225	1643	244	92
Navy	190	1222	225	87
Air Force	304	1795	307	138
DARPA	22	177	42	11
DNA	7	171	46	10
SDIO	12	552	154	53
	760	5560	1018	391

FY 1987 Program

	Number of Topics	Proposals Received	Phase I Awards	Phase II Awards
Army	330	2402	331	119
Navy	263	2004	286	74
Air Force	241	1863	351	64
DARPA	33	395	59	11
DNA	8	200	25	3
SDIO	14	672	212	39
	889	7536	1264	310

Public Law 99-443, the "Small Business Innovation Act of 1986" was signed by the President on October 6, 1986. This law re-authorized P.L. 97-219 to extend the "Sunset Clause" to 1993; to continue 1.25 percent taxation of the extramural research and development budget; and excludes from taxation those amounts of the DoD research and development budget obligated solely for operational systems development.

SUBMITTED BY

2G ENTERPRISES
897 INDEPENDENCE AVE
MOUNTAIN VIEW, CA 94043
CONTRACT NUMBER:
DR WILLIAM L GOODMAN
TITLE:
DEVELOPMENT OF THIN FILM MAGNETIC FIELD SENSOR SYSTEMS
TOPIC# 25 OFFICE: ONT IDENT#: 26371

WE PROPOSE TO ANALYZE THE PERFORMANCE OF LOW FREQUENCY SUPER-CONDUCTING MAGNETIC FIELD MEASURING SYSTEMS EMPLOYING THIN FILM ELEMENTS. BASED UPON THIS ANALYSIS, WE WILL DEVELOP THIN FILM DESIGNS FOR: 1. THIN FILM PICKUP LOOPS FOR MAGNETIC FIELD GRADIENT MEASUREMENT; 2. THIN FILM DC SQUID, AND 3. INTEGRATED GRADIENT MEASURING SYSTEM CONSISTING OF A THIN FILM PICKUP COIL AND THIN FILM SQUID ON A SINGLE SUBSTRAIGHT. THE RESULT OF THE PROJECT WILL BE THE PRODUCTION OF DESIGNS THAT CAN BE FABRICATED AND EVALUATED IN LATER PROJECT PHASES. THE PROPOSED WORK WILL BE A JOINT EFFORT BETWEEN 2G ENTERPRISES, MOUNTAIN VIEW, CALIFORNIA (ACTING AS THE PRIME CONTRACTOR) AND HYPRES, INC., ELMSFORD, NEW YORK.

ACCURATE AUTOMATION CORP
409 CHESTNUT ST - STE A180
CHATTANOOGA, TN 37402
CONTRACT NUMBER:
ROBERT M PAP
TITLE:
ASR-9 RDAR/AIR TRAFFIC CONTROL INTERFACE
TOPIC# 65 OFFICE: NAVAIR IDENT#: 24461

THE ARS-9 PRIMARY SURVEILLANCE RADAR HAS A DIGITAL OUTPUT INSTEAD OF THE ANALOG OUTPUT OF IT'S PREDECESSORS. THE COMPUTER AND DIS-PLAYS EQUIPMENT FOR NAVAL AIR TRAFFIC CONTROL COMPUTER NEEDS DIFFERENT DATA THAN THE ASR-9, NOW SUPPLIES. AN INTERFACE WILL BE DESIGNED THAT WILL TAKE THE OUTPUT OF THE ASR-9 EITHER FROM MODEM OR FIBER OPTICK LINK OR MICROWAVE LINK OR ON-SITE ATTACHMENT AND CONVERT FOR THE APPROPRIATE AN/UYK-ATC COMPUTER AND POSSIBLY THE DISPLAY INDICATORS. OTHER FORMS OF REFORMATTED DIGITAL OR ANALOG

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DATA CAN BE CREATED BY USING A MICROPROCESSOR LIKE THE 68000 FAMILY. THIS INTERFACE CAN BE ADAPTED TO HAVE A LAN OUTPUT TO DISPLAY. THE DESIGN WILL USE A COMMERCIAL COMPUTER AND BUS.

ADA TECHNOLOGIES INC
304 INVERNESS WY S/STE 480/HONEY WELL CT
ENGLEWOOD, CO 80112
CONTRACT NUMBER:
DR CYNTHIA L BENNER
TITLE:
DEVELOPMENT OF A RELIABLE REAL-TIME FREON DETECTOR
TOPIC# 92 OFFICE: NAVSEA IDENT#: 24696

IN ORDER TO PREVENT INJURY OR DEATH RESULTING FROM OXYGEN DEPRIVATION CAUSED BY THE RELEASE OF HIGH CONCENTRATIONS OF FREON GASES IN INDOOR ENVIRONMENTS, A SIMPLE, COMPACT, RELIABLE FREON MONITORING DEVICE IS PROPOSED. THE ELECTRON-CAPTURE DETECTOR WILL BE USED AS THE FREON-SENSING ELEMENT IN THE MONITOR BECAUSE OF ITS PROVEN SENSITIVITY AND SELECTIVITY TO FREONS. THE PROPOSED INSTRUMENT, WHICH OPERATES ON THE PRINCIPLE OF MOLECULAR DIFFUSION, WILL HAVE THE CAPABILITY TO SERVE AS BOTH AN AREA MONITOR AND A PERSONAL MONITOR. THE DIFFUSION INSTRUMENT WILL UNDERGO THOROUGH LABORATORY EVALUATION BY TESTING DIFFERENT COMPONENTS OF THE ELECTRON-CAPTURE DETECTOR TO DETERMINE WHICH CONFIGURATION YIELDS THE BEST OVERALL ACCURACY, PRECISION AND RESPONSE TIME. THREE ALTERNATIVE DESIGNS FOR THE FREON INSTRUMENT ARE ALSO PROPOSED IN THE EVENT THAT THE DIFFUSION INSTRUMENT PROVES TO BE UNACCEPTABLE. THE FREON INSTRUMENT WILL BE DESIGNED TO BE COMPACT, ROBUST, SIMPLE TO OPERATE AND CALIBRATE, LOW IN POWER REQUIREMENT, EQUIPPED WITH A WARNING SYSTEM TO NOTIFY PERSONNEL OF DANGEROUS FREON CONCENTRATIONS WITHIN TWO SECONDS, AND COMPATIBLE WITH A SHIPBOARD FIBER OPTIC NETWORK.

ADVANCED COMMUNICATION SYSTEMS INC
2011 CRYSTAL DR - 1 CRYSTAL PK/STE 301
ARLINGTON, VA 22202
CONTRACT NUMBER:
MARGARET F SULLIVAN
TITLE:
INTELLIGENT RDT&E MANAGEMENT INFORMATION SYSTEM
TOPIC# 10 OFFICE: ONT IDENT#: 23433

SUBMITTED BY

THE OBJECTIVE OF THE PROPOSED PROJECT IS TO ASSEMBLE AVAILABLE SOFTWARE PROGRAMS INTO AN INTELLIGENCT RDT&E MANAGEMENT INFORMATION SYSTEM (MIS) FOR PERSONAL COMPUTERS.

ADVANCED COMPOSITE PRODUCTS INC
21 COMMERCE DR
NORTH BRANFORD, CT 06471
CONTRACT NUMBER:
DOUGLAS HOON
TITLE:
FLAMMABILITY SMOKE AND TOXICITY CHARACTERIZATION OF THERMOPLASTIC COMPOSITE MATERIALS FOR SUBMARINE USE
TOPIC# 73 OFFICE: NAVSEA IDENT#: 24631

THE OBJECTIVE OF THIS EFFORT IS TO ASSESS LIGHTWEIGHT STRUCTURAL COMPOSITE MATERIALS WITH GREATLY IMPROVED FLAMMABILITY, SMOKE GENERATION, AND TOXIC FUME GENERATION (FST) PROPERTIES FOR USE IN NAVY INTERNAL SUBMARINE APPLICATIONS. THE MATERIALS TO BE EVALUATED CONSIST OF GLASS REINFORCING FIBERS BLENDED IN A THERMOPLASTIC MATRIX WITH PRECISE FIBER/RESIN VOLUME FRACTION CONTROL. THE THERMOPLASTIC (TP) RESINS TO BE EVALUATED OFFER SIGNIFICANTLY IMPROVED FST PERFORMANCE WHEN COMPARED TO EPOXY AND POLYESTER THERMOSET RESINS. EXTENSIVE PRELIMINARY FST DATA IS GENERATED IN ACCORDANCE WITH NAVY DRAFT MILITARY STANDARD, "FIRE AND TOXICITY PERFORMANCE REQUIREMENTS FOR COMPOSITE MATERIALS USED IN NULL, MACHINERY AND STRUCTURAL APPLICATIONS INSIDE NAVAL SUBMARINES" FOR THE CANDIDATE MATERIALS AND COMPARED TO A GLASS/PHENOLIC BASELINE. IT IS ANTICIPATED THAT AT THE CONCLUSION OF PHASE I, THE DESIREABLE FST PROPERTIES OF THERMOPLASTIC MATRIX GLASS FIBER COMPOSITE MATERIALS WILL HAVE BEEN DEMONSTRATED.

ADVANCED ENGINEERING
4138 UDALL ST
SAN DIEGO, CA 92107
CONTRACT NUMBER:
ROBIE FAULKNER
TITLE:
STUDY OF A LOW WAKE SUBMARINE PERISCOPE AND MAST FAIRING
TOPIC# 220 OFFICE: NUSC IDENT#: 23095

SUBMITTED BY

THE OVERALL TECHNICAL OBJECTIVE OF THIS PROPOSED PHASE I PROGRAM IS TO ACCOMPLISH A DESIGN STUDY AND ANALYSIS WHICH WILL DETAIL HOW TO OBTAIN WAKE REDUCTION OF A SUBMARINE MAST AND PERISCOPE. AN ANALYSIS WILL BE PERFORMED TO DETAIL METHODS OF REDUCING THE WAKE OF A SURFACE PIERCEING BODY OF THE DESIGN CHARACTERISTICS OF A MAST AND/OR PERISCOPE. THE DESIGN STUDY AND ANALYSIS ARE AIMED AT DETAILING HOW TO ACHIEVE WAKE REDUCTION AND TO DETERMINE IF THE PROPOSED APPROACH OF USING A SPECIALLY DESIGNED FAIRING IS FEASIBLE. THE PHASE I PROPOSAL ALSO INCLUDES PROOF OF CONCEPT TESTING AND DESIGN OF A CONCEPTUAL MODEL WHICH CAN BE FABRICATED AND TESTED AT SEA IN PHASE II.

ADVANCED POWER SOURCES INC
269 WESTWOOD RD
LANCASTER, NY 14086
CONTRACT NUMBER:
ROBERT M MURPHY
TITLE:
DEVELOPMENT OF A HIGH ENERGY DENSITY Ca/THIONYL CHLORIDE BATTERY FOR USE IN NAVY MINES
TOPIC# 193 OFFICE: NSWC IDENT#: 23983

THE DEVELOPMENT OF A CALCIUM/THIONYL CHLORIDE BATTERY SYSTEM SUITABLE FOR USE IN U.S. NAVAL MINES IS INVESTIGATED. THE PERFORMANCE AND SAFETY OF A CALCIUM THIONYL CHLORIDE BATTERY WILL BE INVESTIGATED. VARIOUS CARBON ELECTRODE FORMULATIONS USING CATALYSTS WHICH PROVED BENEFICIAL IN LITHIUM/THIONYL CHLORIDE WILL BE INVESTIGATED FOR USE IN THE CALCIUM THIONYL CHLORIDE SYSTEM.

ADVANCED SYSTEM TECHNOLOGIES
12200 E BRIARWOOD AVE - STE 260
ENGLEWOOD, CO 80112
CONTRACT NUMBER:
DUANE R BALL
TITLE:
A HARDWARE SCALABLE MICROPROCESSOR-BASED TESTBED FOR SYSTEM-LEVEL SIMULATION
TOPIC# 175 OFFICE: NSWC IDENT#: 23860

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THIS IS A PROPOSAL TO DESIGN AND IMPLEMENT AN EFFICIENT AND ECONOMICAL MICROPROCESSOR-BASED TESTBED FOR SYSTEM-LEVEL SIMULATION WHICH IS EASILY SCALABLE IN HARDWARE RESOURCES AND WHICH HAS A POWERFUL DEVELOPMENT ENVIRONMENT. THE PERFORMANCE TARGET OF THE TESTBED IS A TIME COMPRESSION TEN TIME GREATER THAN THAT FROM ONE OF THE CONSTITUENT PROCESSORS. THE SIMULATION TESTBED WILL BE DESIGNED TO EXECUTE ON A PARALLEL COMPUTING SYSTEM USING A NETWORK-TYPE INTERCONNECTION NETWORK. THE CRUCIAL ELEMENT OF SIMULATION, EVENTS CHAIN MANAGEMENT, WILL BE DISTRIBUTED ACROSS MULTIPLE PROCESSORS. IN OUR APPROACH, DEVICES IN THE MODELED SYSTEM ARE ASSIGNED TO INDIVIDUAL PROCESSING ELEMENTS OF THE SIMULATOR HOST MACHINE AND THE INTERACTION AMONG THESE DEVICES IS REPRESENTED THROUGH SOME FORM OF MESSAGE PASSING SCHEME. DURING PHASE I OF THIS RESEARCH, WE HOPE TO ACHIEVE THE FOLLOWING OBJECTIVES TO DEMONSTRATE THE FEASIBILITY OF OUR APPROACH: TO DEVELOP AN EFFECTIVE CONCURRENCY CONTROL STRATEGY; TO DETERMINE AN APPROPRIATE HARDWARE HOST WITH A POWERFUL DEVELOPMENT ENVIRONMENT; AND TO DEVELOP A DESIGN FOR IMPLEMENTING THE TESTBED.

ADVANCED TECHNOLOGY & RESEARCH CORP
14900 SWEITZER LN
LAUREL, MD 20707
CONTRACT NUMBER:
DR NABIH E BEDEWI
TITLE:
NONDESTRUCTIVE EVALUATION OF CERAMIC USING SYSTEM IDENTIFICATION
TOPIC# 70 OFFICE: NAVAIR IDENT#: 24484

CERAMIC MATERIALS ARE UNDER CONSIDERATION FOR STRUCTURAL COMPONENTS IN ADVANCED HEAT ENGINES FOR SEVERAL REASONS. THE PRIMARY MOTIVATION IS THEIR HIGH STRENGTH UNDER SIGNIFICANTLY INCREASING OPERATING TEMPERATURES. THE USE OF THESE HIGH TEMPERATURE MATERIALS WILL PERMIT BETTER FUEL EFFICIENCY AND REDUCE COOLING SYSTEM REQUIREMENTS. DUE TO THEIR ATOMIC STRUCTURE, CERAMICS INTRINSICALLY EXHIBIT LOW STRAIN TOLERANCE AND LOW FRACTURE TOUGHNESS. LOW TOUGHNESS, WHEN COMBINED WITH DESIRED TENSILE STRESS STATES, USUALLY RESULTS IN VERY SMALL CRITICAL FLAW SIZE. THE PROGRAM CONSISTS OF TESTING STRUCTURAL ELEMENTS OF SIMPLE CONSTRUCTION. IT WILL BE DETERMINED WHETHER THE

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RANDOM DECREMENT (RANDOMDEC) TECHNIQUE CAN CORRECTLY ASSESS DAMAGE LEVELS, CONSISTENT SIGNATURES, AND DAMPING AS A FUNCTION OF FREQUENCY FOR THESE STRUCTURAL ELEMENTS.

AERO-CHEM RESEARCH LABS INC
PO BOX 12
PRINCETON, NJ 08542
CONTRACT NUMBER:
WILLIAM FELDER
TITLE:
VAPOR COATING OF BORON FUEL PARTICLES BY MAGNESIUM
TOPIC# 152 OFFICE: NSWC IDENT#: 23695

THE OBJECTIVE OF THE PHASE I RESEARCH IS TO DEMONSTRATE THE FEASIBILITY OF VAPOR DEPOSITING A THIN COATING OF MAGNESIUM ON BORON PARTICLES TO PROTECT THEM FROM LOW TEMPERATURE OXIDATION AND AID THEIR IGNITION IN BORON-CONTAINING FUELS. THE FEASIBILITY WILL BE DEMONSTRATED IN A LABORATORY SCALE DIFFUSION-FLOW APPARATUS. COLLECTED, COATED BORON PARTICLES WILL BE EXAMINED WITH OPTICAL AND ELECTRON MICROSCOPY AND BY CHEMICAL ANALYSIS. THE EFFECTS OF GAS AND PARTICLE TEMPERATURE AND OF PARTICLE SIZE ON THE COATING PROCESS WILL BE TESTED. THE RESULTING VAPOR COATING PROCESS WILL BE COMBINED WITH A PROPRIETARY PROCESS FOR PRODUCING HIGH PURITY BORON POWDERS FOR COMBUSTION APPLICATIONS IN FUTURE WORK.

AERODYNE RESEARCH INC
45 MANNING RD
BILLERICA, MA 01821
CONTRACT NUMBER:
DR KURT D ANNEN
TITLE:
INFRARED DECOY SPECTRAL SIGNATURE MODIFICATION
TOPIC# 174 OFFICE: NSWC IDENT#: 23859

PRESENT INFRARED DECOYS FOR PROTECTION OF NAVY SHIPS ARE RELIABLE, HIGH INTENSITY COMBUSTION SOURCES. HOWEVER, THEIR EMISSION SPECTRA HAVE CHARACTERISTICS WHICH ALLOW THEM TO BE DISTINGUISHED FROM THE

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SHIPS THEY ARE INTENDED TO PROTECT. IT IS DESIRABLE TO DEVELOP MODIFIED FUELS WHOSE COMBUSTION WOULD PRODUCE INFRARED SIGNATURES WITH THE APPROPRIATE SPECTRAL PROPERTIES. THIS GOAL REQUIRES A DETAILED UNDERSTANDING OF THE RADIATION MECHANISMS INVOLVED, AND A SYSTEMATIC METHOD OF SELECTING THE MOST PROMISING FUEL FORMULATIONS. IN THIS PROPOSAL, A DETAILED COMPUTER MODEL OF DECOY RADIATION IS OUTLINES. THE PROGRAM INCLUDES MODEL DEVELOPMENT THROUGH DATA ANALYSIS AND MODIFICATION OF EXISTING COMPUTER CODES, COUPLED WITH A STUDY TO YIELD NEW FIELD IDEAS FOLLOWED BY EVALUATION USING THE MODEL.

AKM ASSOC INC
635 MARINER'S ISLAND BLVD - #205
SAN MATEO, CA 94404
CONTRACT NUMBER:
ROBERT A WALSER
TITLE:
LONG HAUL FIBER-OPTIC LINK FOR NAVY RANGES
TOPIC# 149 OFFICE: NSWC IDENT#: 23680

THE REQUIREMENT FOR A LONG HAUL FIBER OPTIC LINK FOR NAVY RANGES WILL BE SATISFIED WITH AN INNOVATIVE MIX OF PROVEN TECHNIQUES AND THE LATEST TECHNOLOGY. THE PRINCIPAL INVESTIGATOR HAS THE KNOWLEDGE AND EXPERIENCE TO COMBINE THE LATEST PROVEN TECHNOLOGY IN SEVERAL RELATED FIELDS TO ACHIEVE A LOW COST, LOW POWER, HIGH PERFORMANCE SOLUTION TO THE IN-WATER DATA GATHERING REQUIREMENTS. RELIABLE LED FIBER OPTIC DRIVERS AND RECEIVERS ARE AVAILABLE AT LOW COST. NEW FIBER AND CONNECTORS HAVE MUCH LOWER LOSSES. MILITARY CABLE SUPPLIERS ARE AVAILABLE TO COMBINE POWER AND FIBER ELEMENTS IN A SINGLE CABLE WITH SUFFICIENT STRENGTH AND RUGGED ENVIRONMENTAL PROPERTIES. THE MOST SIGNIFICANT ELEMENT OF THIS SOLUTION IS THE RECENT RELEASE OF VERY HIGH SPEED CMOS MICROCONTROLLERS AND DATA INTERFACE LOGIC WHICH PERMITS SIMPLE, LOW COST, RELIABLE SOLUTIONS TO THE TERMINAL DESIGN PROBLEM USING OFF-THE-SHELF DEVICES. WHILE ADA WILL BE USED AS THE DESIGN LANGUAGE, THE SMALL, REAL-TIME CONTROL CODE (IN ASSEMBLY LANGUAGE) WILL ONLY NEED TO CONTROL FORMAT AND SEQUENCE OF THE DATA MESSAGES. THIS APPROACH WILL GREATLY REDUCE THE TERMINAL COMPLEXITY. REDUNDANCE WILL BE RESEARCHED BASED ON SPECIFIC RELIABILITY AND SURVIVABILITY ISSUES. THIS PROJECT WILL RESULT IN A DETAILED DESIGN

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AND DOCUMENTATION PACKAGE TO SUPPORT THE REQUIREMENT. FIBER OPTIC COMPONENTS AND CABLE WILL BE RESEARCHED, AND COST PERFORMANCE TRADE-OFFS DOCUMENTED. TERMINAL LOGIC WILL BE DESIGNED, DRAWINGS PREPARED, AND A LABORATORY FEASIBILITY DEMONSTRATION WILL BE CONDUCTED.

ALTUS CORP
1610 CRANE CT
SAN JOSE, CA 95112
CONTRACT NUMBER:
J PHILLIPS
TITLE:
HIGH RATE RECHARGEABLE Li/SO(2) CELL
TOPIC# 166 OFFICE: NSWC IDENT#: 23816

THE HIGH RATE CAPABILITY OF TWO ELECTROCHEMICALLY DISTINCT RECHARGEABLE LITHIUM POWER SOURCES WILL BE EXAMINED IN ORDER TO QUANTITATIVELY DETERMINE THOSE FACTORS WHICH PROMOTE LONG CYCLE LIFE AND LOW POLARIZATION IN HIGH DISCHARGE RATE APPLICATIONS. BOTH SYSTEMS EMPLOY A SULFUR DIOXIDE ELECTROLYTE WHICH DEMONSTRATES HIGH IONIC CONDUCTIVITY; HOWEVER, IN ONE SYSTEM THE ELECTROCHEMICAL DISCHARGE RESULTS IN A DILUTION OF THE ELECTROLYTE WHILE IN THE OTHER SYSTEM THE NET ELECTROLYTE CONCENTRATION IS INVARIANT OVER THE DISCHARGE DURATION. BASED UPON THE HIGH RATE PERFORMANCE COMPARISON ONE SYSTEM WILL BE SELECTED FOR FURTHER OPTIMIZATION OVER THE 0-25 DEG TEMPERATURE RANGE. A NEW COMMERCIALLY AVAILABLE MICROPOROUS TEFZEL SEPARATOR WILL BE EVALUATED FOR THIS HIGH RATE APPLICATION. THIS MATERIAL IS INERT TO BOTH LITHIUM AND THE OXIDIZING ELECTROLYTE AND IS AVAILABLE AS 1.5 MIL THICK SHEETS BETWEEN POROSITIES OF 40, 60, AND 80%. POSSIBLE TRADE-OFFS BETWEEN HIGH RATE CAPACITY AND CYCLE LIFE WILL BE INVESTIGATED. THE FINAL STAGE OF PHASE I PROGRAM WILL EVALUATE THE EFFECTS OF ELECTROLYTE CHANGES ON THE HIGH RATE PERFORMANCE OF THE CHOSEN SYSTEM.

AMERICAN POLYWATER CORP
PO BOX 53
STILLWATER, MN 55082
CONTRACT NUMBER:
JOHN M FEE
TITLE:
DEVELOPMENT OF A MATERIAL FOR SUPPRESSION OF EXPLOSION SHOCK ENER
TOPIC# 83 OFFICE: NAVSEA IDENT#: 24527

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THIS PROJECT WILL PREPARE FOR EVALUATION A MATERIAL WHICH SHOULD DEMONSTRATE SUPERIOR PERFORMANCE IN ABSORBING AND DISSIPATING EXPLOSION SHOCK ENERGY. THE COMPOSITION PROPOSED AND ITS BASIS FOR PERFORMANCE ARE EXPLAINED. SHOCK WAVE TESTING WILL BE UNDERTAKEN; AND BASED ON THE RESULTS, RECOMMENDATIONS WILL BE MADE FOR FUTURE PROJECT DIRECTION.

AMERICAN RESEARCH CORP OF VA
PO BOX 3406
RADFORD, VA 24143
CONTRACT NUMBER:
DR USHA V VASEASHTA
TITLE:
NEW AND IMPROVED FERRIMAGNETIC MATERIALS FOR HIGH FREQUENCY TRANSFORMERS AND INDUCTOR COILS
TOPIC# 7 OFFICE: ONR IDENT#: 22366

HIGH PREMEABILITY AND LOW POWER LOSS HEAD THE REQUIREMENTS LAID DOWN FOR A GOOD CORE MATERIAL FOR INDUCTANCE COILS AND TRANSFORMERS FOR THE APPLICATION IN HIGH EFFICIENCY POWER SUPPLY. RECENTLY FERRITE MATERIALS, SUCH AS NICKEL-ZINC-COBALT (NiZnCo) FERRITES HAVE BEEN USED FOR TRANSFORMER AND INDUCTOR CORES BECAUSE OF THEIR HIGH RESISTIVITIES AND CONSEQUENT LOWER EDDY CURRENT LOSSES. HOWEVER, THESE FERRITES STILL LACK THE HIGH PERMEABILITY NEEDED TO REDUCE ENERGY LOSSES AND IMPROVE THE EFFICIENCY OF POWER SUPPLIES AT MEGAHERTZ FREQUENCIES. THE TARGET OF OPPORTUNITY IN THIS PROPOSAL IS TO IMPROVE THE PERMEABILITY VALUES AND REDUCE THE LOSSES OF NiZnCo FERRITES IN THE FREQUENCY RANGE OF 1-100 MHz BY TAILORING THE MICROSTRUCTURE DURING SINTERING AND ADDING SMALL AMOUNTS OF IMPURITY ATOMS. THE PHASE I PROGRAM WILL ESTABLISH THE FEASIBILITY OF IMPROVING NiZnCo FERRITES BY ESTABLISHING THE TYPE AND AMOUNT OF SUBSTITUTION IONS NECESSARY TO IMPROVE PERMEABILITY, TO MONITOR THE FABRICATION PARAMETERS AND TO OPTIMIZE A PROOF-OF-CONCEPT SYSTEM FOR A PROTOTYPE FABRICATION PROCESS TO BE DEVELOPED IN THE PHASE II PROGRAM AND COMMERCIALIZED IN THE PHASE III PROGRAM.

ANALYTIC POWER CORP
PO BOX 1189
BOSTON, MA 02117
CONTRACT NUMBER:
DAVID P BLOOMFIELD
TITLE:
FUEL CELLS FOR NAVAL AUXILIARY POWER
TOPIC# 22 OFFICE: ONT IDENT#: 26350

SUBMITTED BY

ANALYTIC POWER PROPOSES A SYSTEM ANALYSIS OF THREE POTENTIAL NAVAL AUXILIARY POWER PLANTS USING FUEL CELL TECHNOLOGY. A SYSTEMS ANALYSIS OF THIS APPLICATION IS MANDATORY BECAUSE, MORE OFTEN THAN NOT, THE FUEL CELL IS NOT THE LIMITING TECHNOLOGY. IN MANY CASES, THE FUEL PROCESSOR CAN BE MUCH LARGER THAN THE FUEL TAN AND THE POWER CONDITIONER MAY BE LARGER THAN THE FUEL CELL. CONVENTIONAL COMMERCIAL FUEL CELL POWER PLANT TECHNOLOGIES BEING DEVELOPED FOR STATIONARY APPLICATIONS HAVE SPECIFIC WEIGHTS (1LB/kW) MORE THAN AN ORDER OF MAGNITUDE LARGER THAN DIESELS AND GAS TURBINES. THESE UNITS HAVE SPECIFIC VOLUMES (FT(3)/kW) AND SPECIFIC COSTS ($/kW) MORE THAN TWO ORDERS OF MAGNITUDE LARGER THAN DIESELS AND GAS TURBINES. MOREOVER, SEVERAL FUEL CELL TECHNOLOGIES ARE AVAILABLE WHICH RANGE FROM 2000 DEG F SOLID OXIDE TO 200 DEG F ALKALINE, WITH A HOST OF TECHNOLOGIES IN BETWEEN. ANALYTIC POWER HAS THE EXPERIENCE IN SYSTEMS ANALYSIS AND FIRST HAND EXPERIENCE IN BUILDING FUEL CELLS AND STACKS. WE PERFORM SYSTEMS ANALYSIS FOR FUEL CELL MANUFACTURERS. IN THIS PROPOSAL WE HAVE SELECTED THREE APPROACHES WHICH HAVE THE BEST CHANCE OF COMPETING SUCCESSFULLY WITH CONVENTIONAL AUXILIARY POWER SYSTEMS.

ANAREN MICROWAVE
6635 KIRKVILLE RD
EAST SYRACUSE, NY 13057
CONTRACT NUMBER:
LEONARD PACIOREK
TITLE:
FREUENCY MODULATION ON PULSE TRANSMISSIONS
TOPIC# 77 OFFICE: NAVSEA IDENT#: 24655

MEASUREMENT OF FREQUENCY MODULATION ON PULSED SIGNALS IS A MATTER OF MAJOR CONCERN WHEN MANUFACTURING A PULSED SIGNAL SOURCE WITH SPECIFIED MODULATION CHARACTERISTICS. THESE MEASUREMENTS ARE ALSO IMPORTANT IN FIELD APPLICATIONS TO VERIFY PULSED SIGNAL PERFORMANCE OR TO DETERMINE THE NATURE OF FREQUENCY MODULATION. CONVENTIONAL DISCRIMINATOR TECHNIQUES ARE NOT SUITABLE FOR MEASURING FREQUENCY MODULATION ON SHORT PULSES WITH POOR SIGNAL TO NOISE CONDITIONS. THE DEVICE TO BE INVESTIGATED IS BASED ON A DELAY LINE DISCRIMINATOR WHERE FREQUENCY MODULATION INFORMATION IS INSENSITIVE TO AMPLITUDE

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FLUCTUATIONS OF THE PULSED SIGNAL. THIS APPROACH CAN PROVIDE A MEASUREMENT OF THE AMOUNT AND WAVEFORM OF FREQUENCY MODULATION OCCURRING ON A SINGLE SHORT DURATION PULSE. THE METHOD IS WELL SUITED FOR DIGITAL PROCESSING OF THE DISCRIMINATOR OUTPUT ON A PULSE BY PULSE BASIS.

ANRO ENGINEERING CONSULTANTS INC
1800 SECOND ST - STE 965
SARASOTA, FL 34236
CONTRACT NUMBER:
DR GERALD F ROSS
TITLE:
EXTENDING THE PERFORMANCE OF ANRO'S BASEBAND REFLECTOMETER (ABR) FOR U.S. NAVY IMPULSE RADAR APPLICATION
TOPIC# 98 OFFICE: NAVSEA IDENT#: 24775

THE PURPOSE OF THE PHASE I PROGRAM IS TO CONDUCT A SURVEY OF THE STATE OF THE ART OF IMPULSE RADAR TECHNOLOGY AND ITS APPLICABILITY TO U.S. NAVY PROBLEMS. ANRO PROPOSES TO CONDUCT BOTH A THEORETICAL AND EXPERIMENTAL STUDY BY USING AN EXISTING SHORT RANGE IMPLUSE RADAR, DEVELOPED UNDER A CURRENT DNA SBIR PROGRAM FOR INTRUSION DETECTION, AS A BASELINE MODE FOR EVALUATING DIFFERENT INNOVATIONS. UNDER PHASE I, ANRO WILL INVESTIGATE (1) NEW FAST HIGH VOLTAGE SWITCHING DEVICES, (2) WIDE INSTANTANEOUS BANDWIDTH RADIATING ELEMENT, (3) ARRAYS OF THESE ELEMENTS, (4) SHORT PULSE SENSITIVE RECEIVERS, AND (5) APPROPRIATE DISPLAY TECHNIQUES. THE GOALS OF THIS EVALUATION ARE TO ACCOMPLISH INCREASE RANGE AND BEAM STEERING CAPABILITY, WHILE MAINTAINING A 1 FOOT RANGE RESOLUTION OR BETTER. THE PROPOSED PHASE I PROGRAM INCLUDES, SPECIFICALLY, THE EXPERIMENTAL EVALUATION OF DEPOSITED FILM AMORPHOUS SEMICONDUCTOR SWITCHES, TIME-LIMITED IMPULSE RESPONSE RADIATINE ELEMENTS, AND NEW SUPERHETERODYNE RANGE GATED RECEIVER CONCEPT NOW OPERATING AND INVENTED BY TIME DOMAIN SYSTEMS, INC. (TDSI). LIMITED FIELD TESTING UNDER PHASE I WILL BE PERFORMED BY SPERRY MARINE, INC (SMI), A SECOND SUBCONTRACTOR. UPON SUCCESSFULY COMPLETING PHASE I, ANRO WILL WORK WITH NAVY PERSONNEL IN DEVELOPING AN IMPULSE RADAR FOR A GIVEN APPLICATION; FOR EXAMPLE, DETECTION OF SEA SKIMMING MISSILES. AS MORE COST EFFECTIVE HIGH VOLTAGE SWITCHING DEVICES BECOME AVAILABE, THEY WILL BE INTRODUCED DURING PHASE II.

SUBMITTED BY

APA OPTICS
2950 - NE 84TH LN
BLAINE, MN 55432
CONTRACT NUMBER:
DR W T BOORD
TITLE:
SINGLE MODE FIBER OPTICS COUPLER
TOPIC# 129 OFFICE: NSWC IDENT#: 23520

THE OBJECTIVES OF THE PROPOSAL EFFORT ARE TO IMPROVE THE RELIABILITY AND TO REDUCE THE FABRICATION COSTS OF SINGLE MODE FIBEROPTICS COUPLERS BY: 1. DEVELOPING THICK, SINGLE MODE WAVEGUIDES WITH IDENTICAL CROSS SECTIONAL PROFILE MATCHING THAT OF SINGLE MODE FIBERS; AND 2. LOCATING THESE FIBERS TO WAVEGUIDES, MADE OF ELECTRO-OPTIC MATERIAL, USING PREALIGNED ETCHED "V" GROOVES IN A GaAs SUB-STRATE. OUR APPROACH IS BASED ON COUPLING THE INFORMATION FROM INPUT FIBERS TO SINGLE MODE WAVEGUIDES, ELECTRICALLY SWITCHING THE INFORMA-TION AMONG VARIOUS WAVEGUIDES AS DESIRED, AND EXITING THE INFORMATION FROM THE WAVEGUIDES TO OUTPUT FIBERS. REALIZATION OF THE THICK, SINGLE MODE WAVEGUIDES WILL PROVIDE A RELIABLE, LOW COST AND ENVIRONMENTALLY STABLE FIBER TO WAVEGUIDE COUPLING, AND FORMS THE BASIS OF OUR INNOVATIVE IDEA. KEY TECHNICAL ISSUES IN A TYPICAL SINGLE MODE FIBER AND WAVEGUIDE ARISE DUE TO CROSS SECTIONAL MIS-MATCH BETWEEN THE FIBER (5.0 MICRON) AND THE WAVEGUIDE (IN 0.5 MICRON). IN PHASE I, WE PROPOSE TO DEMONSTRATE THE FEASIBILITY OF THICK, FIBER-PROFILE MATCHED WAVEGUIDES BY DESIGNING, FABRICATING AND TESTING OF THE WAVEGUIDES. IN PHASE II WE WILL DESIGN AND BUILD A COMPLETE DEVICE TO DEMONSTRATE LOW COST, HIGH PERFORMANCE, ENVIRONMENTALLY STABLE SINGLE MODE FIBER OPTICS COUPLED DEVICES.

APD CRYOGENICS INC
1919 VULTEE ST
ALLENTOWN, PA 18103
CONTRACT NUMBER:
DR RALPH C LONGSWORTH
TITLE:
MINIATURE TWO STAGE J-T CRYOSTAT
TOPIC# 209 OFFICE: NWC IDENT#: 23173

SUBMITTED BY

A MINIATURE TWO STAGE JOULE-THOMSON (J-T) CRYOSTAT IN A DEWAR WITH 0.5 IN. DIA X 0.5 IN. LENGTH IS PROPOSED WHICH CAN COOL TO LESS THAN 80 K IN AN AMBIENT OF 75 DEG C. HIGH EFFICIENCY IN THE VERY SMALL HEAT EXCHANGER IS MADE POSSIBLE BY NEW TECHNOLOGY. THE PROGRAM WILL INCLUDE A DEMONSTRATION OF RUN TIME IN EXCESS OF 10 MINUTES USING 15 IN(3) OF GAS.

APPLIED ORDNANCE TECHNOLOGY INC
10905 FT WASHINGTON RD - STE 410
FORT WASHINGTON, MD 20744
CONTRACT NUMBER:
EUGENE E ELZUFON
TITLE:
PROCESS CONTROL FOR PRODUCTION OF HIGHLY SOLID FILLED EXPLOSIVES
TOPIC# 191 OFFICE: NSWC IDENT#: 23979

COMPOSITE EXPLOSIVE MATERIALS LIKE PLASTIC BONDED EXPLOSIVES (PBX'S) ARE CONSIDERABLY LESS SENSITIVE TO HEAT, SHOCK AND IMPACT THAN CONVENTIONAL TNT-BASED EXPLOSIVES. THE NAVY USES THESE IN MANY LOW VOLUME MUNITIONS. THEIR INTRODUCTIONN INTO HIGH USE MUNITIONS WILL PROVIDE SUBSTANTIAL SHIP/PLATFORM SURVIVABILITY IMPROVEMENTS. THESE MATERIALS ARE COMPLEX AND COSTLY TO MIX AND LOAD USING EXISTING HIGH SHEAR ROCKET PROPELLANT MIXER TECHNOLOGY. CONTINUOUS PROCESSING WITH TWIN-SCREW EXTRUDERS HAS BEEN DEMONSTRATED; HOWEVER, FEED EQUIPMENT AND A PRACTICAL PRODUCTION PROCESS CONTROL SYSTEM IS NEEDED TO MAKE SPECIFICATION GRADE MATERIAL AND TO MONITOR AND CONTROL PRODUCT QUALITY. THIS PROGRAM WILL IDENTIFY THE IMPORTANT CONTROL VARIABLES FOR PBX'S AND DEVELOP A CONTROL SCHEME INCLUDING THE TYPES OF ANALYTICAL INSTRUMENTS, CONTROL EQUIPMENT AND DATA ACCUMULATORS.

APPLIED RESEARCH LAB
1745 JEFFERSON DAVIS HWY - STE 601
ARLINGTON, VA 22202
CONTRACT NUMBER:
K F CANNON
TITLE:
SHIPBOARD INDIVIDUAL PROTECTION SYSTEM
TOPIC# 88 OFFICE: NAVSEA IDENT#: 24567

SUBMITTED BY

DOCUMENTED "LESSONS LEARNED" AND INVESTIGATION REPORTS FROM NAVAL SHIPBOARD DISASTERS HAVE CITED NEEDS FOR IMPROVED PROTECTION FOR DAMAGE CONTROL/FIREFIGHTER (DC/FF) PERSONNEL. IMPROVEMENTS RECOMMENDED GENERALLY HAVE ADDRESSED SINGLE ITEMS AND INCREMENTAL CHANGES TO MEET A SPECIFIC PERFORMANCE SHORTFALL. IT IS PROPOSED THAT A SYSTEMS APPROACH BE UTILIZED TO UPGRADE INDIVIDUAL PROTECTION AND DC/FF CAPABILITY WITH A SHIPBOARD INDIVIDUAL PROTECTION SYSTEM (SIPS). FUTURE SHIPS BECAUSE OF REDUCED MANNING WILL REQUIRE MORE EFFICIENT AND EFFECTIVE DC/FF PERFORMANCE. THE SIPS WILL PROTECT THE INDIVIDUAL AGAINST MULTIPLE HAZARDS, WILL REDUCE FATIGUE AND WILL PERMIT A LONGER STAY AT THE FIRE SITE WHILE ENHANCING FUNCTIONAL CAPABILITY THROUGH HUMAN ENGINEERING. PHASE I WILL DEFINE THE SYSTEM ARCHITECTURE AND PROVIDE SUBSYSTEM AND COMPONENT FUNCTIONAL DESCRIPTIONS.

APPLIED TECHNOLOGY ASSOCS
PO BOX 14934
ORLANDO, FL 32814
CONTRACT NUMBER:
DR ROBERT CAVALLERI
TITLE:
SUPERSONIC COMBUSTOR ENHANCEMENT STUDY
TOPIC# 237 OFFICE: NAPC IDENT#: 25203

THE SUPERCOMPUTER HAS MADE POSSIBLE THE USE OF COMPUTATIONAL FLUID DYNAMICS FOR OPTIMIZING THE AERODYNAMICS OF PROPULSION SYSTEM COMPONENTS. THIS ABILITY WILL INCREASE EVEN MORE IN THE NEXT FEW YEARS WHEN NEW SUPERCOMPUTERS BECOME OPERATIONAL, PERMITTING COMPLETE PROPULSION SYSTEMS TO BE ANALYZED. OPTIMUM AERODYNAMIC CONFIGURATIONS REQUIRE ANALYSIS OF COMPLEX INTERNAL GEOMETRICS, ESPECIALLY IN THE TRANSONIC AND MODERATELY SUPERSONIC REGIMES WHERE MAXIMUM DRAG OCCURS. INCLUDED IN THESE TECHNIQUES SHOULD BE THE CAPABILITY TO ANALYZE WALL INJECTION AND COMBUSTION. THE USE OF COMPUTATIONAL FLUID DYNAMICS OFFERS THE POTENTIAL OF SUPPLEMENTING AND IN SOME CASES REPLACING EXPENSIVE AND TIME CONSUMING WIND TUNNEL ORIENTED DEVELOPMENT PROGRAMS. THE PROPOSED EFFORT WILL APPLY COMPUTATIONAL FLUID DYNAMICS AND A SOLID STATE HEAT PIPE CONCEPT TO INVESTIGATE COMBUSTOR EFFICIENCY. THE ANALYSIS WILL INCLUDE AXIAL WALL INJEC-

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TION, STUT INJECTION, AND CHEMICAL REACTIONS. THE TECHNIQUE PROPOSED IS CAPABLE OF MULTITASKING AND MULTIGRIDS. THE DEVELOPMENT OF THIS CAPABILITY WOULD REDUCE COMBUSTOR DEVELOPMENT COSTS, REDUCE DEVELOPMENT TIME AND PERMIT EXTREMELY DETAILED AERODYNAMIC CONFIGURATION OPTIMIZATION.

APPLIED TECHNOLOGY ASSOCS INC
PO BOX 9154
ALBUQUERQUE, NM 87119
CONTRACT NUMBER:
DARREN R LAUGHLIN
TITLE:
MHD ANGULAR SPIN SENSOR (MASS)
TOPIC# 100 OFFICE: NAVSEA IDENT#: 24791

ATA HAS DEVELOPED SEVERAL ANGULAR SENSORS BASED ON THE MAGNETO-HYDRODYNAMIC (MHD) PRINCIPLE AND CURRENTLY HOLDS A PATENT ON THE BASIC DESIGN. THE NAVY REQUIRES A PROJECTILE SPIN SENSOR WHICH CAN MEASURE THE PEAK ANGULAR VELOCITY AND INDIRECTLY, THE PROJECTILE MUZZLE VELOCITY. THIS INFORMATION CAN THEN BE USED TO SET CONTROLLED VARIABLE TIME (CVT) FUSES FOR PRECISE PROXIMITY DETONATION. AN MBD ANGULAR SPIN SENSOR, OR MASS, WILL BE DESIGNED TO MEASURE PEAK ANGULAR VELOCITIES OF 60 TO 450 REVOLUTIONS/SEC WITH AN ACCURACY OF +/-1%. THE MASS MUST NOT EXCEED THE VOLUME OF A TO-8 TRANSISTOR CAN AND MUST ALSO BE CAPABLE OF WITHSTANDING AXIAL FORCES OF 75,000g; AND CROSS AXIAL FORCES OF 20,000g.

AQUANAUTICS CORP
4560 HORTON ST
EMERYVILLE, CA 94608
CONTRACT NUMBER:
DR SAM MOHANTA
TITLE:
ELECTROCHEMICAL OXYGEN PRESSURIZATION USING A CHEMICAL GAS-TO-LIQUID CONVERTER
TOPIC# 247 OFFICE: DTNSRDC IDENT#: 22432

CONVENTIONAL HIGH PRESSURE OXYGEN COMPRESSORS ARE UNSAFE DUE TO THE

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HIGH COMBUSTIBILITY OF OIL IN THE PRESENCE OF PURE OXYGEN. THEY MUST BE SPECIALLY DESIGNED TO ELIMINATE CONTACT BETWEEN OXYGEN AND OIL. CONVENTIONAL OXYGEN COMPRESSORS ARE ALSO INEFFICIENT AND REQUIRE SPECIAL MAINTENANCE. BINDING THE OXYGEN IN A LIQUID PRIOR TO PRESSURIZATION IS POTENTIALLY SAFER, MORE ENERGY EFFICIENT AND MORE RELIABLE. AQUANAUTICS CORPORATION IS DEVELOPING AN ARTIFICAL GILL TECHNOLOGY FOR DARPA WHICH IS ALSO BEING EVALUATED BY THE NAVY FOR SHIPBOARD OXYGEN SEPARATION FROM AIR AT ONE ATMOSPHERE. THE TECHNOLOGY SELECTIVELY EXTRACTS THE OXYGEN BY COMPLEXING IT INTO A LIQUID. THE OXYGEN IS THEN RELEASED USING A LOW POWER ELECTRO-CHEMICAL DESORBTION PROCESS. THE PROCESS MAY ALSO BE USEFUL FOR SAFETY PRESSURIZING PURE OXYGEN. FOR PHASE I, AQUANAUTICS PROPOSES TO PERFORM FEASIBILITY RESEARCH AND ENGINEERING TO DEFINE THE SPECIFICATIONS OF A PRESSURIZED SYSTEM. THE NAVY CAN APPLY THIS REVOLUTIONARY TECHNOLOGY WITH ONLY A SMALL INCREMENTAL INVESTMENT BECAUSE AQUANAUTICS HAS ALREADY INVESTED MORE THAN $7 MILLION IN R & D. AQUANAUTICS HAS DEMONSTRATED SIGNIFICANT TECHNICAL CAPABILITIES WITH A TEAM OF TWENTY PROFESSIONAL, OF WHOM TEN HOLD Ph.D. DEGREES. THE COMPANY HAS SBIR EXPERIENCE AND THE FACILITIES TO CONDUCT THE SCOPE OF WORK.

AQUIDNECK MANAGEMENT ASSOCS LTD
6 JOHN CLARK RD
MIDDLETOWN, RI 02840
CONTRACT NUMBER:
ROBERT H WALLACE
TITLE:
MULTI-MEDIA DATABASE MANAGMENT FOR NAVY COMMAND AND CONTROL INFORMATION SYSTEMS
TOPIC# 40 OFFICE: SPAWAR IDENT#: 24393

THE NEED FOR SOPHISTICATED DATABASE MANAGEMENT SUPPORT IN NAVY COMMAND AND CONTROL SYSTEMS CONTINUES TO GROW. HOWEVER, CONVENTIONAL DATABASE MANAGEMENT STRATEGIES AND TECHNIQUES ARE NOT CURRENTLY MEETING THE UNIQUE NEEDS OF NAVY DECISION SUPPORT SYSTEMS, WHICH RE-QUIRE EXTENDED CAPABILITIES FOR HANDLING UNCONVENTIONAL DATA FORMATS AND TEMPORAL INFORMATION. IN THIS PROPOSAL, AQUIDNECK MANAGEMENT ASSOCIATES (AMA) DESCRIBES AN APPROACH TO ESTABLISHING A HYPERMEDIA DOCUMENT VIEW OF NAVY COMMAND AND CONTROL INFORMATION AND ESTABLISHES

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PLANS FOR DEVELOPING MODELS TO ANALYZE ITS FEASIBILITY. AMA PROPOSES TO INVESTIGATE STATE OF THE ART WORK IN HYPERMEDIA AND INNOVATIONS IN MEDIAL STORAGE TECHNOLOGY AND ACCESS TECHNIQUES. USING CURRENTLY AVAILABLE COMMERCIAL HYPERTEXT/HYPERMEDIA APPLICATIONS, AMA WILL CONSTRUCT A DATABASE MODEL AND BUILD A PROTOTYPE DBMS. AMA WILL THEN DEVELOP AN IMPLEMENTATION PLAN FOR A MULTI-MEDIA DATABASE MANAGEMENT SYSTEM WHICH WILL PROVIDE NAVY COMMAND AND CONTROL DECISION MAKERS WITH A FLEXIBLE, POWERFUL DATABASE MANAGEMENT SYSTEM WHICH SATISFIES THEIR UNIQUE REQUIREMENTS.

ARCTIC ENERGIES LTD
511 HEAVITREE LN
SEVERNA PARK, MD 21146
CONTRACT NUMBER:
HARLEY A SMITH
TITLE:
SMALL SUBMERSIBLE FUEL SUBSYSTEM AND ENERGY CONVERTER SYSTEM INTEGRATION ANALYSIS
TOPIC# 94 OFFICE: NAVSEA IDENT#: 24727

AEL WILL EVALUATE VARIOUS CARNOT CYCLE HEAT ENGINES (DYNAMIC CONVERTERS) AS WELL AS ELECTROCHEMICAL ENERGY CONVERTERS APPLICABLE TO SMALL SUBMERSIBLES OR AUV'S OVER THE POWER RANGE OF 20 TO 50 kW, WITH SYSTEM ENDURANCES OF 2 TO 10 MWh. THE SUCCESSFUL INTEGRATION OF THE ENERGY CONVERTERS, FUEL AND EXHAUST SUBSYSTEMS STARTS WITH PRECISE REQUIREMENTS DEFINITION, WHICH IS DERIVED FROM MISSION ANALYSES. FOR EXAMPLE, ONE-SHOT HIGH SPEED TORPEDOS HAVE A DIFFERENT MISSION THAN SLOWER SUBMERSIBLE VEHICLES DESIGNED FOR REPEATED RENDEZVOUS, REFUELING AND REDEPLOYMENT FROM THE SUPPORT SYSTEM. PARTICULARLY IN THE CASE OF SUBMARINE SUPPORT, THE SUBMERSIBLE VEHICLE'S INTEGRATION MUST BE COMPATIBLE WITH THE SUBMARINE'S CAPABILITIES, OR LIMITATIONS, AS A SUPPORT SYSTEM. BASED ON NUMEROUS PREVIOUS SURFACE AS WELL AS UNDERSEA VEHICLE AND SUBMARINE SYSTEM INTEGRATION ANALYSES, AEL BELIEVES THAT FUEL CELL PROPULSION FOR SUBMERSIBLES WILL BE SHOWN TO BE VERY MISSION RESPONSIVE. FURTHER, BECAUSE PRESSURE BALANCING THE ENERGY CONVERTER TO THE AMBIENT SEA PRESSURE WILL LIKELY BE SHOWN TO BE MOST APPROPRIATE, WE HAVE ENLISTED THE SUPPORT, AS A SUBCONTRACTOR, OF A FIRM INVOLVED IN APPROPRIATE ELECTROCHEMICAL ENERGY SOURCE DEVELOPMENTS, ENERGY

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RESEARCH CORP. (ERC). AEL AND ERC PREVIOUSLY EXAMINED FUEL CELL PROPELLED SUBMARINE ISSUES. IN PHASE II A SUBSCALE DEMONSTRATION OF A PRESSURIZED FUEL CELL SYSTEM COULD BE DONE, USING A DTNSRDCA TEST TANK.

AREA THERM CORP
14845 BUILD AMERICA DR
WOODBRIDGE, VA 22192
CONTRACT NUMBER:
DR EDWARD F ALLARD
TITLE:
SUPPRESSION OF COMBAT VEHICLES
TOPIC# 32 OFFICE: MARCORPS IDENT#: 24304

ATC PROPOSES TO THERMALLY SUPPRESS A COMBAT VEHICLE OF THE MARINES' CHOICE. ATC SUBMITS THAT THE PROPOSED DESIGN NOT ONLY WILL DEMONSTRATE EXCELLENT THERMAL SUPPRESSION, BUT POSSIBLY MAY BE THE BEST DAY AND NIGHT PERFORMING SUPPRESSOR ON THE MARKET TODAY OR IN THE NEAR FUTURE. ATC HAS USED ITS TECHNOLOGY TO SUPPRESS OPERATING MIL-STD ENGINE-GENERATOR SETS TO NEAR PERFECT SUPPRESSION. THERE IS NO TECHNICAL IMPEDIMENT TO APPLYING THE TECHNOLOGY TO MARINE VEHICLES. SINCE PHASE I IS LIMITED IN SCOPE, ATC PROPOSES TO SUPPRESS A VEHICLE FROM ONE VIEW ANGLE. ATC WILL BUILD THE SUPPRESSORS, MOUNT THEM ON THE VEHICLE, FIELD TEST THEM AND WRITE A FINAL REPORT.

ASTRON RESEARCH & ENGINEERING
130 KIFER CT
SUNNYVALE, CA 94086
CONTRACT NUMBER:
RAYMOND C TOROK
TITLE:
SHIP DE-ICING USING TWO-PHASE FLASHING FLOW
TOPIC# 11 OFFICE: ONT IDENT#: 23455

MUCH ACTUAL SHIPBOARD DE-ICING IS CURRENTLY DONE MANUALLY WITH BROOMS, SCRAPERS, AND AXE-HANDLES. EXISTING HYDRODYNAMIC SYSTEMS

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INCLUDE HIGH PRESSURE PULSED WATER JETS (WHICH ARE QUICK TO CUT ICE WITH THEIR HIGH MOMENTUM, BUT SLOW TO BREAK ICE ADHESION DUE TO THEIR LOW ENTHALPY) AND STEAM SPRAYS (WHICH HAVE HIGH ENTHALP, BUT LOW MOMENTUM, AND LOW FLOW RATES FOR HOSE SYSTEMS). THE TWO-PHASE FLOW DE-ICING METHOD PROPOSED HERE PROVIDES THE ADVANTAGES OF BOTH SYSTEMS. SUPERHEATED WATER IS DELIVERED BY HOSE TO A SPECIALLY-DESIGNED TWO-PHASE FLASHING NOZZLE. THE STEAM/WATER JET CUTS AND REMOVES ICE WITH HIGH MOMENTUM AND ENTHALPY. SINCE THERE IS NO BOILING PRIOR TO THE NOZZLE, SEA WATER CAN BE USED. PHASE I WILL INCLUDE RESEARCH TO DETERMINE THE OPTIMUM SUPERHEATED WATER PROPERTIES AND FLASHING NOZZLE DESIGN. AN APPROPRIATE DE-ICING TEST PROCEDURE WILL BE DEVELOPED AND USED TO EVALUATE CANDIDATE CONFIGURATIONS. A PROTOTYPE SHIPBOARD SYSTEM WILL BE DESIGNED, BASED ON DEMONSTRATED TEST RESULTS.

ATAC
1200 VILLA ST
MOUNTAIN VIEW, CA 94041
CONTRACT NUMBER:
CHUCK R THOMPSON
TITLE:
A REAL-TIME NAVAL OPERATOR WORKLOAD ESTIMATION SYSTEM
TOPIC# 105 OFFICE: NAVSEA IDENT#: 24816

THE OBJECTIVES OF PHASE I OF THIS PROJECT ARE TO (1) SELECT A WORKLOAD MODELING APPROACH THAT IS APPROPRIATE FOR ESTIMATING NAVAL OPERATOR WORKLOAD IN REAL-TIME, (2) SPECIFY A REAL-TIME NAVAL OPERATOR WORKLOAD ESTIMATION SYSTEM BASED ON THE SELECTED WORKLOAD MODELING APPROACH, AND (3) INVESTIGATE WAYS IN WHICH THE WORKLOAD MODELING APPROACH OR THE WORKLOAD ESTIMATION SYSTEM CAN BE GENERALIZED TO APPLY TO OTHER SITUATIONS AND OPERTORS. IN PHASE II, THE SPECIFIED SYSTEMS WILL BE DEMONSTRATED, AND THE DESIRABILITY AND FEASIBILITY OF GENERALIZING THE SYSTEM FOR OTHER APPLICATIONS WILL BE DECIDED. THE SYSTEM SPECIFIED IN THIS PROJECT WILL BE BASED ON WORKLOAD MODELING APPROACHES THAT HAVE BEEN PROVEN EFFECTIVE IN ESTIMATING OPERATOR WORKLOAD IN COMPLEX CONTROL SITUATIONS. MODIFICATIONS AND ENHANCEMENTS IN THESE APPROACHES WILL HAVE BEEN MADE AS NECESSARY TO PROVIDE THAT THE SYSTEM EFFECTIVELY ESTIMATES NAVAL OPERATOR WORKLOAD DURING TIMES OF TACTICAL DECISION MAKING. THIS INFORMATION CAN BE USED TO PREDICT IMPENDING

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PERIODS OF OPERATOR WORK OVERLOAD SO THAT ACTIONS CAN BE TAKEN TO REDUCE THE OPERATOR'S WORKLOAD TO MAINTAIN MISSION CAPABILITIES AND SYSTEM PERFORMANCE.

ATLANTIC APPLIED RESEARCH CORP
4 - "A" STREET
BURLINGTON, MA 01803
CONTRACT NUMBER:
DAVID S GREELEY
TITLE:
SUBMARINE MAST WAKE REDUCTION
TOPIC# 220 OFFICE: NUSC IDENT#: 23096

A SUBMARINE MAST OR PERISCOPE WHICH PIERCES THE FREE SURFACE GENERATES A VISUALLY OBSERVABLE WAKE ON THE FREE SURFACE WHICH RENDERS THE SUBMARINE VULNERABLE TO DETECTION. IT IS PROPOSED TO INVESTIGATE THE FEASIBILITY OF REDUCING THIS WAKE BY A COMBINATION OF ACTIVE AND PASSIVE FLOW CONTROL DEVICES ATTACHED TO THE MAST OR PERISCOPE. A DEVICE SIMILAR TO A BULBOUS BOW ON SHIPS WILL BE USED TO REDUCE THE FREE SURFACE DISTURBANCES AROUND THE MAST, WHICH CONSIST OF WAVE HUMPS AND HOLLOWS, BREAKING WAVES WHICH ENTRAIN BUBBLES, A NECKLACK VORTEX, AND A ROOSTER TAIL AT HIGHER SPEEDS. THE 'BULBOUS BOW' DEVICE WILL BE DYNAMICALLY ADJUSTABLE TO PROVIDE NEAR-FIELD WAVE CANCELLATION AT VARIOUS SPEEDS, AND WITH THE MAST OR PERISCOPE SUBJECT TO VARYING EMERSION DUE TO SUBMARINE DEPTH FLUCTUATIONS AND OCEAN WAVES. THE TURBULENT WAKE BEHIND THE MAST WILL BE REDUCED BY FLUID BLOWING AT THE REAR OF THE MAST, TO REPLACE THE MOMENTUM LOST DUE TO THE DRAG OF THE MAST. THE BLOWING AT THE TRAILING EDGE WILL BE VARIED FROM SIDE TO SIDE TO COUNTERACT THE LIFT FLUCTUATIONS THAT WOULD OTHERWISE DEVELOP ON THE MAST DUE TO ANGLE OF ATTACK VARIATIONS RESULTING FROM OBLIQUE OCEAN WAVES.

ATLANTIC APPLIED RESEARCH CORP
4 - 'A' ST
BURLINGTON, MA 01803
CONTRACT NUMBER:
PETER J STEIN
TITLE:
LOW FREQUENCY TRANSIENT LOCALIZATION BY SONOBUOY ARRAY
TOPIC# 61 OFFICE: NAVAIR IDENT#: 24452

SUBMITTED BY

IT IS PROPOSED THAT A COMPUTER CODE BE DEVELOPED WHICH WILL LOCATE AND DEDUCE THE SIGNATURE OF LOW FREQUENCY TRANSIENTS BY SPARCE SONOBUOY ARRAYS. IT WILL BE ASSUMED THAT WE KNOW THE PROPERTIES OF THE PROPAGATING MEDIUM AND THAT IT IS HORIZONTALLY STRATIFIED. THE ALGORITHM WILL HAVE FOUR PARTS: 1) A DETECTION SCHEME, 2) A CORRELATION ROUTINE TO DETERMINE TIME DELAYS, 3) A ROUTINE TO DETERMINE LOCATION USING THE TIME DELAYS, AND 4) A ROUTINE TO DETERMINE THE TRANSIENT SIGNATURE AT THE SOURCE LOCATION. PERFORMANCE OF THE ALGORITHM WILL BE DETERMINED AS A FUNCTION OF TRANSIENT TYPE, OCEAN PARAMETERS, AND SONOBUOY ARRAY GEOMETRY.

AV DYNAMICS INC
825 MYRTLE AVE
MONROVIA, CA 91016
CONTRACT NUMBER:
DR P B S LISSAMAN
TITLE:
SUBMARINE MAST WAKE REDUCTION
TOPIC# 220 OFFICE: NUSC IDENT#: 23097

TO AUGMENT THE STEALTH FEATURES OF THE SUBMARINE, INNOVATIVE METHODS OF MINIMIZING THE OBSERVABLES DUE TO THE SURFACE PIERCING MAST ARE PROPOSED. OBSERVATION TECHNIQUES INCLUDE VISUAL (EYBALL FROM SURFACE OR AIR) ELECTRO-OPTIC (TV) AND RADAR FROM SURFACE, AIR OR SPACE. OBSERVABLES IN THE OPTICAL WAVE LENGTHS INCLUDE SPRAY, FOAM, WAKES AND SURFACE WAVE PATTERNS. IT IS NOTED THAT MODERN TECHNIQUES EXIST TO VIRTUALLY ELIMINATE SURFACE WAVE MAKING WHICH WOULD THEN ELIMINATE ALL THE ABOVE OPTICAL OBSERVABLES BY APPLYING A SPECIALLY DESIGNED FAIRING TO MAST. RECENT RESEARCH HAS INDICATED THAT SPECIALLY CONTOURED HORIZONTAL FINS CAN THEORETICALLY ELIMINATE WAVE DRAG FROM A BODY OF FINITE DISPLACEMENT. THIS RADICAL AND INNOVATIVE CONCEPT WHICH WILL BE APPLIED HERE. IT HAS LONG BEEN KNOWN THAT MASSIVE ASPIRATION, SUCTION AT THE BOW AND BLOWING AT THE STERN, CAN MAKE A BODY EFFECTIVELY OF ZERO THICKNESS AND WAVELESS. THE FLOW FEATURES OF THESE FAIRINGS CAN BE DESIGNED AND PREDICTED WITH FAIR ACCURACY BY VARIOUS COMPUTER CODES. THE ASPIRATION METHODS ARE APPLICABLE OVER A CRUISE SPEED RANGE BY ACTIVE CONTROL OF ASPIRATION AS FROUDE NUMBER VARIES WHILE THE ANGLE OF ATTACK OF THE

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FIN MAY BE VARIED WITH SPEED FOR THE SAME PURPOSE. A THREE PART TECHNICAL PROGRAM IS PROPOSED INCLUDING: DEFINITION OF OBSERVABLES, DESIGN OF INNOVATIVE WAVELESS FAIRINGS, EVALUATION OF FAIRINGS AND SELECTION OF BEST CANDIDATES. PHASE II WILL INVOLVE THE ACTUAL TEST OF WAVELESS FAIRINGS.

BELTRAN INC
1133 - E 35TH ST
BROOKLYN, NY 11210
CONTRACT NUMBER:
THOMAS C KOSVIC
TITLE:
USE OF A CFD PROGRAM FOR SUBMARINE MAST WAKE REDUCTION
TOPIC# 220 OFFICE: NUSC IDENT#: 23098

MODERN GENERAL PURPOSE VISCOUS FLOW CFD MODELING PROGRAMS WILL BE APPLIED TO DEVELOP METHODS FOR REDUCING THE VISIBLE WAKE PRODUCED BY SUBMARINES AT PERISCOPE DEPTH. DR. S. PANTKAR WILL ASSIST IN THE EFFORT. TECHNIQUES TO BE EXAMINED INCLUDE IMPROVE FAIRING DESIGN, FLOW MODIFICATION DEVICES, AND POLYMER ADDITION TO ALTER FLUID PROPERTIES.

BELTRAN INC
1133 - E 35TH ST
BROOKLYN, NY 11210
CONTRACT NUMBER:
T S RAVI
TITLE:
NAVAL VESSEL SURFACE DE-ICING - HEAT PIPE APPLICATION
TOPIC# 11 OFFICE: ONT IDENT#: 23456

ICE FORMATION ON NAVAL VESSELS IS A SERIOUS PROBLEM. THE ICE IS FORMED BY OCEAN SPRAY WHEN THERE IS AN APPROPRIATE COMBINATION OF STRONG WINDS AND LOW AIR TEMPERATURE. IT CAN ACCUMULATE TO SUCH AN EXTENT THAT IT CAN PLACE THE VESSEL IN DANGER OF CAPSIZING. ONE POSSIBLE SOLUTION IS TO USE HEAT PIPE TECHNOLOGY DEICE THE VESSEL. IN THIS METHOD, THE CRITICAL SECTIONS OF THE NAVAL VESSELS ARE

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EQUIPPED WITH HEAT PIPES. THE HEAT SOURCE FOR THE HEAT PIPE CAN BE FROM THE SEA, ENGINE WATER HEAT, STEAM, OR DIRECT FUEL FIRING. THE FIRST PHASE OBJECTIVE OF THIS PROJECT WOULD INCLUDE THE SELECTION OF THE CONTAINER MATERIAL MOST SUITED TO ENDURE THE VARIOUS WEATHER CONDITIONS ENCOUNTERED BY NAVAL SURFACE SHIPS, THE TESTING OF COMPATIBLE NONTOXIC WORKING FLUIDS THAT APPLY TO THE RELATIVELY LOW WORKING TEMPERATURES, AND THE APPROPRIATE WICK STRUCTURE FOR SPECIFIC APPLICATIONS.

BUSINESS & TECHNOLOGICAL SYSTEMS INC
14504 GREENVIEW DR - STE 500
LAUREL, MD 20708
CONTRACT NUMBER:
JAMES S VANDERGRAFT
TITLE:
LOCAL AREA NETWORK EVALUATION
TOPIC# 131 OFFICE: NSWC IDENT#: 23552

RECENTLY, A NEW TECHNIQUE FOR MODELLING THE FLOW OF DATA THROUGH AN INFORMATION PROCESSING SYSTEM HAS BEEN DEVELOPED. IT HAS RECEIVED LIMITED TESTING ON COMPUTER SYSTEMS AND LOCAL AREA NETWORKS. THIS TESTING HAS SHOWN THAT THE TECHNIQUE, BASED ON ANALYZING THE INFORMATION FLOW AS A FLUID FLOW, IS MORE WIDELY APPLICABLE THAN VARIOUS APPROXIMATION METHODS BASED ON QUEUING THEORY IDEAS. AT THE SAME TIME, IT IS EASIER TO APPLY AND LESS COSTLY TO EXERCISE THAN DISCRETE EVENT SIMULATION METHODS. FOR THESE REASONS, IT SHOULD BE AN IDEAL METHOD FOR ANALYZING AND EVALUATING LOCAL AREA NETWORKS (LAN'S) THAT ARE PROPOSED FOR USE IN SHIPBOARD TACTICAL SYSTEMS. THE OBJECTIVES OF THIS PROJECT ARE TWOFOLD; FIRST TO SHOW HOW THIS NEW METHOD CAN BE USED TO ASSESS LAN'S THAT WILL BE PROPOSED FOR NAVY APPLICATIONS, AND SECOND, TO STUDY THE FEASIBILITY OF DESIGNING A USER INTERFACE THAT WILL ALLOW A SYSTEMS ANALYST TO APPLY THE TOOL WITHOUT HAVING TO UNDERSTAND ALL THE DETAILS OF HOW IT WORKS.

CAMBRIDGE SCIENTIFIC INC
195 COMMON ST
BELMONT, MA 02178
CONTRACT NUMBER:
DR DEBRA J TRANTOLO
TITLE:
ELECTRIALLY-CONDUCTING POLYMERS MODELLED ON BIOPOLYMERS
TOPIC# 157 OFFICE: NSWC IDENT#: 23721

SUBMITTED BY

WE WILL FOCUS ON THE DESIGN, PREPARATION, AND CHARACTERIZATION OF A SERIES OF ORGANIC POLYMERS WHICH WILL HAVE CONDUCTING CAPABILITIES COMPARABLE TO THOSE OF POLYACETYLENE, AN EXTREMELY CONDUCTIVE, YET UNSTABLE, ORGANIC POLYMER. THESE POLYMERS ARE TO HAVE INHERENT STRUCTURAL PROPERTIES OF ALIGNMENT AND STABILITY MODELLED AFTER NATURALLY OCCURING POLYMERS SUCH AS PROTEINS. UTILIZING INTUITIVE DESIGN METHODS AND LITERATURE PRECEDENT, POLYMER SEQUENCES EXPECTED TO FOLLOW THE TEMPLATES OF "NATURAL" BIOPOLYMERS WILL BE SELECTED. SUCH BIOPOLYMERS WILL BE PREPARED BY BULK POLYMERIZATION OF THE APPROPRIATE SUBUNITS, AS WELL AS DIRECT DERIVATIZATION OF PREPOLYMERIZED TEMPLATES. BIOPOLYMERIC MATERIALS, AS EXEMPLIFIED BY THE BROAD CLASS OF POLYMERS KNOWN AS "POLYPEPTIDES", ARE POTENTIALLY ELECTRICALLY CONDUCTIVE BY VIRTUE OF EITHER THEIR DIRECT OR THEIR INDIRECT BIOLOGICAL FUNCTIONS. THE MOLECULAR ORGANIZATIONAL TENDENCIES OF MOST POLYPEPTIDES TO ORDERED STRUCTURES CAN BE CITED AS AN ADDITIONAL JUSTIFICATION FOR THE POTENTIAL TOWARD ELECTRICAL CONDUCTIVITY. THE PROPOSED WORK WILL INVESTIGATE THE POTENTIAL FOR ELECTRICAL CONDUCTIVITY OF POLYPEPTIDES BY IMPOSING STRINGENT REQUIREMENTS UPON THE MOLECULAR STRUCTURE.

CAPE COD RESEARCH INC
PO BOX 600
BUZZARDS BAY, MA 02532
CONTRACT NUMBER:
R SCOTT MORRIS
TITLE:
CERAMIC SUPERCONDUCTING MATERIALS
TOPIC# 158 OFFICE: NSWC IDENT#: 23743

SUPERCONDUCTING CERAMICS HOLD PROMISE FOR NUMEROUS APPLICATIONS IN ENERGY STORAGE, COMMUNICATIONS AND SENSING TECHNOLOGIES. HOWEVER, TECHNICAL PROBLEMS ASSOCIATED WITH THE FABRICATION AND PROCESSING OF THESE MATERIALS MUST FIRST BE OVERCOME. THIS RESEARCH APPLIED ELECTROCHEMICAL DEPOSITION TO THE PROBLEMS OF PROCESSING SUPERCONDUCTING CERAMICS. IF SUCCESSFUL, THE NONAQUEOUS TECHNIQUES PROPOSED COULD QUICKLY TAKE DEVELOPMENTS IN CERAMIC SUPERCONDUCTORS FROM THE LABORATORY TO THE MARKETPLACE.

CAPE COD RESEARCH INC
PO BOX 600
BUZZARDS BAY, MA 02532
CONTRACT NUMBER:
MYLES WALSH
TITLE:
SINGLE CELL ALUMINUM MINE BATTERY SYSTEM
TOPIC# 193 OFFICE: NSWC IDENT#: 23984

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THE BATTERY SYSTEMS PRESENTLY USED TO POWER NAVAL MINES HAVE VERY LIMITED SHELF LIVES AND VERY LIMITED SPECIFIC POWER AND SPECIFIC ENERGY. THEY LIMIT THE LONG-TERM PERFORMANCE OF SOPHISTICATED SYSTEMS FOR DETECTION OF TARGETS AND CONTROL OF THE MINE. THIS RESEARCH INVESTIGATES THE FEASIBILITY OF UTILIZING SINGLE CELL SEA-WATER BATTERIES FOR POWERING NAVAL MINES OF THE 1990s.

CAPE COD RESEARCH INC
PO BOX 600
BUZZARDS BAY, MA 02532
CONTRACT NUMBER: N68335-89-C-0097
DR BRIAN G DIXON
TITLE:
CHEMICAL WARFARE PROTECTIVE PAINTS
TOPIC# 224 OFFICE: NAEC IDENT#: 24049

THIS RESEARCH INVOLVES THE DEVELOPMENT OF A NOVEL TYPE OF CHEMICAL AGENT RESISTANT COATING (CARC) FOR AVIATION GROUND SUPPORT SYSTEMS. THE APPROACH IS TO EXTEND THE CAPABILITIES OF STATE-OF-THE-ART PAINTS BY INCORPORATING AN ADDITIONAL COMPONENT WHICH WILL CHEMICALLY NEUTRALIZE THE TOXIC EFFECTS OF AND RENDER INNOCUOUS BATTLEFIELD CW AGENTS. IT IS ANTICIPATED THAT THE PAINT WILL BE EASILY DECONTAMINATED, RELATIVELY INEXPENSIVE, AND EASY TO APPLY.

CENTRA TECHNOLOGY INC
3204 MONROE ST - STE 300
ROCKVILLE, MD 20852
CONTRACT NUMBER:
ROBERT E BLASE
TITLE:
MULTIPATH MODELING: DISTATIC RADAR DETECTION WITH DUCTING AND MULTIPATH
TOPIC# 75 OFFICE: NAVSEA IDENT#: 24645

BISTATIC AND MONO-STATIC RADARS ARE AFFECTED BY DUCTING AND MULTIPATH UNDER CERTAIN ENVIRONMENTAL CONDITIONS. THESE EFFECTS MAY BE

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POSITIVE OR NEGATIVE DEPENDING ON THE PARTICULAR CONDITIONS AND TARGET-GEOMETRY. LOW FLYER DETECTION IS TYPICALLY ENHANCED BY THE PRESENCE OF AN EVAPORATION DUCT. IN ORDER FOR THE NAVY TO APPROPRIATELY ASSESS THE CAPABILITY OF ITS RADARS IN DUCTING AND MULTIPATH CONDITIONS, QUANTITATIVE METHODS MUST BE AVAILABLE TO COMPUTE AND PREDICT DETECTION PERFORMANCE. SEVERAL NAVY MODELS ARE CURRENTLY AVAILABLE TO COMPUTE THE DETECTION RANGE OF MONO-STATIC RADARS IN DUCTING CONDITIONS. SIMILAR MODELS FOR BISTATIC SYSTEMS ARE NOT AVAILABLE AND SHOULD BE DEVELOPED. THE PROPOSED WORK IS INTENDED TO SHOW THAT CURRENT NAVY MONO-STATIC DUCTING/MULTIPATH MODELS CAN BE APPROPRIATELY MODIFIED TO MAKE THEM APPLICABLE TO THE EVALUATION OF BISTATIC RADAR DETECTION PERFORMANCE WITHOUT A MAJOR EXPENDITURE. USE OF SLIGHTLY MODIFIED ALGORITHMS WILL PRODUCE THE MAXIMUM PERFORMANCE CAPABILITY WITH MINIMAL INVESTMENT. IN ORDER TO USE EXISTING DUCTING MODELS TO EVALUATE BISTATIC RADARS, CENTRA WILL: STUDY THE DUCTING PROBLEM AS IT APPLIES TO BISTATIC DETECTION OF LOW-FLYING TARGETS AND DETERMINE ITS UNIQUE ASPECTS; EXAMINE EXISTING DUCTING MODELS; MODIFY THE EXISTING MODELS TO INCLUDE BISTATIC EFFECTS; AND IMPLEMENT THE MODIFIED ALGORITHM.

CERAMATEC INC
2425 - S 900RD W
SALT LAKE CITY, UT 84119
CONTRACT NUMBER:
SANTOSH Y LIMAYE
TITLE:
NOVEL MULLITE FELT REINFORCED COMPOSITES FOR ADVANCED RADOME APPLICATIONS
TOPIC# 159 OFFICE: NSWC IDENT#: 23749

A STABLE LOW, DIELECTRIC CONSTANT, HIGH STRENGTH, A GOOD THERMAL SHOCK RESISTANCE ARE THE MAJOR CRITERIA FOR SELECTING A RADOME MATERIAL. A FIBEROUS MULLITE FELT REINFORCEMENT OFFERS MANY OF THESE PROPERTIES TO MAKE SUITABLE RADOME COMPOSITE MATERIAL. CERAMATEC, INC. PROPOSES TO REINFORCE A MULLITE FELT USING SOL-GEL TECHNIQUE WHICH OFFERS MAJOR ADVANTAGES OVER CONVENTIONAL SLURRY IMPREGNATION OR EXPENSIVE CHEMICAL VAPOR DEPOSITION TECHNIQUE. ADVANTAGES OF SOL-GEL TECHNIQUE INCLUDE LOWER SINTERING TEMPERATURE, ULTRAFINE HOMOGENEITY AND SUPERIOR MICROSTRUCTURE. DURING PHASE I RESEARCH,

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THE OVERALL OBJECTIVE IS TO DEMONSTRATE THE FEASIBILITY OF FABRICATTING A MULLITE FELT-MULLITE MATRIX COMPOSITE FOR RADOME APPLICATIONS. THE MULLITE FELT WILL BE VACUUM IMPREGNATED WITH A MULLITE SOL. THE IN-SITU SOL-TO-GEL TRANSITION WILL BE ACHIEVED USING AN INTERNAL GELATION TECHNIQUE. THE IMPREGNATED FELT WILL BE SINTERED AND CHARACTERIZED FOR MICROSTRUCTURE, FIBER-MATRIX INTERFACE, MECHANICAL AND DIELECTRIC PROPERTIES. THE ULTIMATE OBJECTIVE IS TO MAKE COMMERCIALLY FEASIBLE MULLITE FELT-MULLITE MATRIX COMPOSITE HAVING SUPERIOR STRENGTH AND DIELECTRIC PROPERTIES.

CERAMATEC INC
2425 - S 900RD W
SALT LAKE CITY, UT 84119
CONTRACT NUMBER:
CURTIS GRIFFIN
TITLE:
INJECTION MOLDING OF CERAMIC MATRIX COMPOSITES
TOPIC# 160 OFFICE: NSWC IDENT#: 23760

THE OVERALL OBJECTIVE OF THIS PROJECT IS TO DEMONSTRATE THE SUCCESSFUL FABRICATION AND DENSIFICATION OF CERAMIC MATRIX COMPOSITES FORMED BY INJECTION MOLDING. TO ACCOMPLISH THIS OBJECTIVE, A DESIGNED TEST MATRIX WILL BE DEVELOPED THAT WILL SYSTEMATICALLY INVESTIGATE THE KEY INJECTION MOLDING AND DEBINDING PARAMETERS SUCH AS BINDER COMPOSITION, SOLIDS RATIO, MOLDING CONDITIONS, DEBINDING CONDITIONS, ETC. CERAMATEC'S LOW- AND HIGH-PRESSURE INJECTION MOLDERS WILL BE USED DURING THE PROJECT. THE COMPOSITE SYSTEM INITIALLY INVESTIGATED DURING PHASE I WILL BE AN SiC WHISKER-Al(2)O(3) MATRIX COMPOSITE DEVELOPED AT CERAMATEC THAT CAN BE PRESSURELESS SINTERED TO GREATER THAN 95% TD. THE RESULTS OF THIS PHASE I WILL ESTABLISH THE FEASIBILITY OF INJECTION MOLDING CERAMIC MATRIX COMPOSITES AND IDENTIFY THE KEY PARAMETERS FOR FURTHER DEVELOPMENT AND OPTIMIZATION IN PHASE II.

CFD RESEARCH CORP
3313 BOB WALLACE AVE - STE 205
HUNTSVILLE, AL 35805
CONTRACT NUMBER:
CLIFFORD E SMITH
TITLE:
DEVELOPMENT OF SCRAMJET PERFORMANCE CORRELATIONS USING AN ADVANCE CFD CODE
TOPIC# 237 OFFICE: NAPC IDENT#: 25205

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COMPARED TO CONVENTIONAL TURBOJET/TURBOFAN ENGINES, THE SUPERSONIC COMBUSTION RAMJET (SCRAMJET) IS A MORE EFFICIENT PROPULSION SYSTEM AT HIGH FLIGHT MACH NUMBERS AND ALTITUDE. HOWEVER, THERE ARE INSUFFICIENT DATA TO ASSESS ENGINE CYCLE PAYOFFS. IT IS PROPOSED TO USE A VALIDATED COMPUTATIONAL FLUID DYNAMICS (CFD) CODE TO PRODUCE THE NEEDED DATA. IN PHASE I, AN EXISTING FAVRE-AVERAGED, COMPRESSIBLE, CHEMICALLY-REACTING, NAVIER-STOKES CODE WILL BE MODIFIED BY INCORPORATING AN IMPROVED SHOCK-CAPTURING SCHEME AND ADDING A GLOBAL HYDROGEN/AIR REACTION-RATE MODEL. AFTER SYSTEMATIC VALIDATION, DEMONSTRATION CALCULATIONS WILL BE PERFORMED ON A GENERIC SCRAMJET CONFIGURATION. RECOMMENDATIONS FOR CODE REFINEMENTS WILL BE MADE, AND NUMERICAL/EXPERIMENTAL TEST PLANS FORMULATED, IN CONSULTATION WITH DR. J. A. SCHETZ (A LEADING EXPERT IN SCRAMJET PROPULSION). PHASE II WILL CONSIST OF FURTHER CODE ENHANCEMENTS AND EXPERIMENTAL TESTING TO PROVIDE DATA FOR ANCHORING CFD MODELS. THE FINAL CODE WILL BE USED TO PERFORM NUMERICAL TESTS IN MUCH THE SAME MANNER AS EXPERIMENTAL TESTS ARE PERFORMED FOR HARDWARE. THE PROJECT WILL CULMINATE IN THE DEVELOPMENT OF CORRELATIONS FOR USE IN ENGINE CYCLE ANALYSIS DECKS.

CHIRP CORP
8248 SUGARMAN DR
LA JOLLA, CA 92037
CONTRACT NUMBER:
DR RICHARD A ALTES
TITLE:
ADAPTIVE PRE-PROCESSING AND TWO-DIMENSIONAL FILTERING FOR SONAR DISPLAYS
TOPIC# 41 OFFICE: SPAWAR IDENT#: 24397

EACH PIXEL IN A CONVENTIONAL PASSIVE SONAR DISPLAY USES ONLY PART OF THE INFORMATION THAT IS AVAILABLE FOR DETECTION. THE ESTIMATOR-CORRELATOR DETECTOR COMBINES THE DIFFERENT PIXELS BY MEANS OF A WIENER FILTER, AND IT USES ALL AVAILABLE (OR HYPOTHESIZED) INFORMATION ABOUT THE DISTRIBUTION OF SIGNAL ENERGY IN FREQUENCY, TIME, AND BEARING. PERFORMANCE AND ROBUTNESS OF THE OPTIMUM DETECTOR CAN BE PREDICTED WITH THE HELP OF A SPECIALLY DESIGNED COMPUTER PROGRAM. IMPLEMENTATION IS GREATLY SIMPLIFIED AND PERFORMANCE IS OPTIMIZED

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WHEN AS MUCH ENERGY AS POSSIBLE IS CONCENTRATED IN THE SMALLEST POSSIBLE NUMBER OF STATISTICALLY INDEPENDENT PIXELS. A FEEDBACK MECHANISM ADJUSTS OUTPUT SAMPLING RATES AND BANDWIDTHS OF CONVENTIONAL FFT-BASED PRE-PROCESSING FILTERS TO OBTAIN THIS CONDITION. IDEALLY, AN ADAPTIVE KARHUNEN-LOEVE FILTERING ALGORITHM IS REQUIRED, AND IMPLEMENTATION OF SUCH FILTERS IS INVESTIGATED. THE WIENER FILTER BASED ESTIMATOR-CORRELATOR IS GENERALIZED TO NON-GAUSSIAN DATA, MULTIDIMENSIONAL DATA, AND VERY HIGH RESOLUTION DATA THAT ARE TOO DETAILED TO BE COMPLETELY DISPLAYED. THE PERFORMANCE OF A HUMAN OBSERVER IS EMULATED BY ADAPTIVELY ADJUSTING HYPOTHESIZED SIGNAL POWER AS A FUNCTION OF TIME AND BEARING.

COMPUDRIVE CORP
49 RIVER ST
MAYNARD, MA 01754
CONTRACT NUMBER:
PRABU NAGAPHUSHAN
TITLE:
QUIET SPEED REDUCER
TOPIC# 116 OFFICE: NAVSEA IDENT#: 24910

THE DEVELOPMENT OF A TWO-STAGE ORBIDRIVER* IS PROPOSED TO ACHIEVE A HIGH RELIABILITY, LOW NOISE TORPEDO DRIVE SPEED REDUCER. ORBIDRIVE IS A GEARLESS, CONCENTRIC SPEED REDUCER WHICH UTILIZES THE CYCLOIDAL MOTION OF A DUAL-FACED, MULTI-LOBED CAM NUTATING ON AN ECCENTRIC SHAFT TO EFFECT DESIRED SPEED REDUCTION. THE ECCENTRIC INPUT SHAFT FORCES THE CAM LOBES TO ENGAGE RESPECTIVE SETS OF ROLLERS, EACH OF WHICH CONTAINS ONE MORE ROLLER THAN THE NUMBER OF MATING CAM LOBES, SUCH THAT THE CAM IS ADVANCED EXACTLY ONE LOBE PER INPUT SHAFT ROTATION WHILE THE OUTPUT SHAFT IS RETARDED EXACTLY ONE LOBE PER CAM ROTATION. TORQUE TRANSMISSION IS THUS ACCOMPLISHED VIA A ROLLING MOTION IN CONTRAST TO THE SLIDING AND GRINDING OF THE MATED GEAR TEETH OF CONVENTIONAL GEAR BOXES. THE KINEMATICS OF THE ORBIDRIVE ARE SHOWN TO AFFORD INHERENTLY LOWER NOISE, HIGHER TORQUE, HIGHER EFFICIENCY AND LOWER FAILURE RATES AT LESS WEIGHT, SIZE AND COST THAN CONVENTIONAL COUNTERPARTS. *ORBIDRIVE IS A REGISTERED TRADEMARK OF COMPUDRIVE CORPORATION.

COMPUSEARCH CORP
7631 LEESBURG PIKE
FALLS CHURCH, VA 22043
CONTRACT NUMBER:
JAMES W BENSON
TITLE:
RAPID DATABASE SEARCH
TOPIC# 216 OFFICE: NUSC IDENT#: 23023

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LARGE QUANTITIES OF INFORMATION MUST BE STORED, RETRIEVED AND SEARCHED IN VERY SHORT PERIODS OF TIME. NO COMBINATION OF STANDARD PC HARDWARE AND SOFTWARE CAN PROVIDE THE RESPONSE REQUIRED WHEN ACCESSING LARGE DATABASES. ONLY AN INNOVATIVE COMBINATION OF NEW HARDWARE, LANGUAGES AND PROGRAMMING ALGORITHMS WILL BE ABLE TO COPE WITH THESE REQUIREMENTS IN REAL-TIME. THE MAIN TECHNICAL OBJECTIVE OF THIS PROPOSAL IS TO DELIVER, IN PHASE I, A PC-BASED MICROCOMPUTER CAPABLE OF RETRIEVING AND SEARCHES THE GOVERNMENT FURNISHED DATABASE AT A SUSTAINED RATE OF 1 MB PER SECOND. THE PROJECT WILL ALSO PROVIDE A CONVENIENT "USER INTERFACE," USING STANDARD COMMERCIALLY AVAILABLE SOFTWARE PACKAGES WHEREVER POSSIBLE. THE DELIVERED SYSTEM WILL CONTAIN SOFTWARE WHICH WILL NOT ONLY ACCESS THE FURNISHED DATABASE, BUT WILL BE GENERAL PURPOSE IN NATURE.

COMPUTER & INFORMATION SCIENCES INC
2316 ANDERSON AVE
MANHATTAN, KS 66502
CONTRACT NUMBER:
JOSEPH J VIDE
TITLE:
SIGNAL PROCESSING AND POST-PROCESSING ENHANCEMENTS USING FIS
TOPIC# 60 OFFICE: NAVAIR IDENT#: 24442

A REMOTE ROBOTIC SENSING DEVICE ENVIRONMENT CONSISTS OF IMPARTING PROCESSES, PHYSICAL EQUIPMENT, MACHINES AND COMPUTERS, AS WELL AS OTHER GENERAL PURPOSE DEVICES USED FOR MAKING INTELLIGENT DECISIONS IN ENVIRONMENTS AND SITUATIONS RANGING FROM BOTH SINGLE TO COMPLEX. A COMPLEX ROBOTIC SENSOR SYSTEM CAN BE THOUGHT OF AS A CLASSICAL FEEDBACK/CONTROL LOOP. AS THE MONITORING SYSTEM IS PRESENTED WITH PHENOMENA THAT MAY RANGE FROM SLIGHT ABNORMALLY TO POTENTIAL CATASTROPHIC, THE SYSTEM MUST DETECT AND WARN THROUGH FEEDBACK. WITHIN THE FEEDBACK/CONTROL LOOP, WE PROPOSE TWO ELEMENTS BOTH SMALL AND FAST ENOUGH TO OPERATE IN REAL TIME CALLED PROVIDER AND DECIDER. THE SIGNIFICANCE OF THE PROVIDER/DECIDER ENTITY IS TO ACCEPT INPUTS FROM MULTIPLE SENSORS, PERFORM SIGNAL FUSION AND MAKE DECISIONS ON ACTION OR INACTION. THE PROVIDER/DECIDER TECHNIQUE PROPOSAL IS KNOWN AS FINITE INDUCTIVE SEQUENCES (FIS) PROCESSING. THIS TECHNIQUE IS AN AI SYSTEM WITH IMPORTANT AND FUNDAMENTAL DIFFERENCES THAT ALLOW

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NEW CAPABILITIES TO SENSOR FUSION. FIS IS A PROPRIETARY SYSTEM DEVELOPED AND OWNED BY CIS.

COOLEY INC
50 EASTERN AVE
PAWTUCKET, RI 02860
CONTRACT NUMBER:
PETER H SCOTT
TITLE:
FIRE RETARDANT COATED FABRIC FOR HAZARDOUS CHEMICAL HANDLER'S PROTECTIVE CLOTHING
TOPIC# 49 OFFICE: NAVSUP IDENT#: 22236

AN OBJECTIVE OF THIS PROJECT WILL BE THE DEVELOPMENT OF NEW AND NOVEL THERMOPLASTIC POLYMER ALLOYS WITH HIGH RESISTANCE TO ALL KNOWN HAZARDOUS CHEMICALS. A FURTHER OBJECTIVE WILL BE TO CROSSLINK INDIVIDUAL POLYMERS IN THESE ALLOYS TO FORM NON-MELTING INTER-PENETRATING POLYMER NETWORKS (IPN'S) WHICH WILL EXHIBIT GREATER RESISTANCE TO HAZARDOUS CHEMICALS THAN THE THERMOPLASTIC ALLOYS FROM WHICH THEY DERIVE. ALLOYS TO BE PREPARED WILL INCLUDE CHLORINATED POLYETHYLENE/POLYURETHANES AND CHLOROSULFONTED POLYETHYLENE/POLYURETHANES. A NUMBER OF CROSSLINKING METHODS WILL BE INVESTIGATED, AND A SECONDARY OBJECTIVE OF THE PROJECT IS TO DEVELOP CROSSLINKING REACTIONS WHICH CAN BE INITIATED AFTER FABRICATION OF THE PROTECTIVE CLOTHING. THE SEAMS OF THE PROTECTIVE CLOTHING CAN THEN BE FABRICATED USING THERMAL TECHNIQUES WHICH WILL PROVIDE THE OPTIMUM BARRIER TO TRANSMISSION OF HAZARDOUS CHEMICALS THROUGH THE SEAM. A FURTHER OBJECTIVE OF THIS PROJECT WILL BE TO INVESTIGATE LAMINATION OF INERT INORGANIC MATERIALS TO THE ALLOYS CITED ABOVE. THESE INORGANIC MATERIALS WILL BE UTILIZED TO ENHANCE RESISTANCE TO HAZARDOUS CHEMICALS AND TO FIRE. WORK WILL BE DONE AT COOLEY, INCORPORATED, A RECOGNIZED LEADER IN SPECIALTY COATED FABRICS AND A PRODUCER OF COATED FABRIC FOR CHEMICAL PROTECTIVE CLOTHING.

CORPORATION FOR STUDIES & ANALYSIS
11222 LA CIENEGA BLVD - STE 621
INGLEWOOD, CA 90304
CONTRACT NUMBER:
DR PETER E JENKINS
TITLE:
REMOTELY PILOTED VEHICLE ENGINE DESIGN
TOPIC# 235 OFFICE: NAPC IDENT#: 25221

SUBMITTED BY

CSA PROPOSES TO DESIGN A ROTO-COMPOUNDED STRATIFIED CHARGE ROTARY ENGINE (RSRE) TO MEET MINI-RPV APPLICATIONS REQUIRED BY THE NAVY. WE WILL FOCUS ON ADVANCED TURBOCHARGING/TURBOCOMPOUNDING TO PROVIDE INCREASED POWER DENSITIES AND WILL DEVELOP A TURBOCHARGING SYSTEM HAVING ENHANCED COMPATIBILITY WITH THE ROTARY ENGINE WHILE STILL PROVIDING THE BOOST REQUIRED FOR INCREASED PERFORMANCE. OUR ROTO-COMPOUNDING SYSTEM WILL UTILIZE A SMALL ROTARY UNIT AS A COMPRESSION EXPANDER COUPLED TO THE OUTPUT OF THE MAIN ROTARY ENGINE. ADVANTAGES OF OUR DESIGN APPROACH CONSIST OF HIGH POWER DENSITY, LOW WEIGHT AND COMPACT SIZE, FUEL ECONOMY, FEWER MOVING PARTS, LOW NOISE AND VIBRATION LEVELS, MULTIFUEL CAPACITY, AND A HIGH DEGREE OF PARTS COMMONALITY. OUR ENGINE WILL BE OPERATIONAL AT TEMPERATURES UP TO -40 DEG F AND CAN BE SIZED TO MEET THE PARAMETERS OF A GIVEN APPLICATION. IT IS LOW RISK AND LOW IN COST DUE TO THE ADVANCED STATE OF ROTARY ENGINE TECHNOLOGY.

CORROSION TESTING LABS INC
70 S CHAPEL ST
NEWARK, DE 19711
CONTRACT NUMBER:
BRAIN J SALDANHA
TITLE:
CORROSION BEHAVIOR OF METAL MATRIX COMPOSITES
TOPIC# 189 OFFICE: NSWC IDENT#: 23964

THE PRIMARY OBJECTIVES OF THIS RESEARCH PROGRAM IN PHASE I ARE TO DEVELOP CORROSION DATA ON A SERIES OF SiC/Al AND Gr/Al METAL MATRIX COMPOSITES. SINCE THESE MATERIALS SHOW SIGNIFICANT POTENTIAL FOR USE IN NAVAL APPLICATIONS, THEIR CORROSION RESISTANCE WILL BE EVALUATED IN DIFFERENT KINDS OF MARINE EXPOSURES. DATA FROM LONG-TERM EXPOSURES, SHORT-TERM ACCELERATED ELECTROCHEMICAL TESTS, AND METALLURGICAL EXAMINATIONS AND SEM/EDXA ANALYSIS OF THE SURFACES, INTERFACES, AND CORROSION PRODUCTS WILL BE DEVELOPED. THIS INFORMATION SHOULD PROVIDE EXPLANATIONS FOR THE MECHANISMS OF CORROSION IN COMPOSITE MATERIALS, WHICH MAY BE USED FOR IMPROVING FABRICATION PROCEDURES, FOR DEVELOPING NEWER OR EXISTING MATERIALS WHICH ADEQUATE CORROSION PROTECTION, AND FOR RECOMMENDING MATERIALS FOR USE IN ACTUAL SERVICE APPLICATIONS.

SUBMITTED BY

CORTANA CORP
7700 LEESBURG PIKE
FALLS CHURCH, VA 22043
CONTRACT NUMBER:
RAYMOND J GRADY
TITLE:
SUBMARINE MAST WAKE REDUCTION
TOPIC# 220 OFFICE: NUSC IDENT#: 23100

THE OBJECTIVE OF THE PROPOSED WORK IS TO PROVIDE A COMPREHENSIVE DESIGN STUDY AND SUPPORTING ANALYSES DETAILING ONE OR MORE METHODS TO SUPPRESS OR ELIMINATE PERISCOPE WAKES. THE APPROACH CONSISTS OF SIX SEPARATE TECHNICAL OPERATIONS: DATA COLLECTION AND EVALUATION, SIGNATURE DEFINITIONS, DETECTABILITY ANALYSIS, IDENTIFICATION OF SUPPRESSION TECHNIQUES, SADDLE-POINT ANALYSES, AND COST-BENEFIT ANALYSIS.

CREARE INC
PO BOX 71 - ETNA RD
HANOVER, NH 03755
CONTRACT NUMBER:
ARKADY S DVINSKY
TITLE:
FLUID FLOW MODELING CODE FOR NAVAL APPLICATIONS
TOPIC# 246 OFFICE: DTNSRDC IDENT#: 22419

THE OBJECTIVE OF THE PROPOSED WORK (PHASE I AND II) IS TO DEVELOP A COMPUTER PROGRAM FOR MODELING COMPLEX THREE-DIMENSIONAL FLOWS ENCOUNTERED IN NAVAL APPLICATIONS. THE SOFTWARE WILL BE BUILT ON CREARE'S FLUID FLOW MODELING CODE FLUENT/BFC. IN PHASE I, WE WILL DEVELOP THE SPECIFICATIONS FOR THE ENHANCEMENTS TO BE ADDED TO THE PROPOSED CODE. TO DEMONSTRATE THE CURRENT CAPABILITIES OF FLUENT/BFC, WE WILL CALCULATE THE FLOW ABOUT AN AIRFOIL/FLAT PLATE JUNCTURE. FINALLY, TO MEET THE SPECIFICATIONS, WE WILL DEVELOP A PLAN FOR THE IMPLEMENTATION OF NEW FEATURES AND CAPABILITIES THAT ARE NOT AVAILABLE IN THE BASE CODE.

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CREATIVISION INC
12722 RESEARCH PKWY
ORLANDO, FL 32826
CONTRACT NUMBER:
JOSEPH L KLINGER
TITLE:
MULTI TRACK OPTICAL DISK RADAR VIDEO RECORDER
TOPIC# 124 OFFICE: NAVSEA IDENT#: 24956

DEVELOPMENT AND DELIVERY OF A DIRECT REPLACEMENT OPTICAL STORAGE DEVICE FOR THE AN-USH-24 14/28 TRACK MAGNETIC TAPE DATA RECORDER. OPTICAL STORAGE DEVICE WILL EMPLOY W.O.R.M. (WRITE ONCE READ MULTIPLE) TECHNOLOGY WITH "STATE OF THE ART" HIGH SPEED ELECTRONIC PERIPHERY HOSTED BY AN 80386 MICROPROCESSOR. UNIT WILL READ AND RECORD DATA ON 5 1/4" REMOVABLE OPTIC DISKS. EACH DISK WILL BE CAPABLE OF STORING UP TO 800 MBYTES OF DIGITAL INFORMATION. ADDITIONALLY, THE UNIT WILL PROVIDE SELF TEST AND DIAGNOSTIC ABILITY AS WELL AS SIMULTANEOUSLY DISPLAYING INCOMING AND RECORDED DATA.

CUYUNA ENGINE CO
PO BOX 116 - 1ST STREET SW
CROSBY, MN 56441
CONTRACT NUMBER:
ROGER P WORTH
TITLE:
REMOTELY PILOTED VEHICLE ENGINE DESIGN
TOPIC# 235 OFFICE: NAPC IDENT#: 25223

THE NAVY DESIRES TO ELIMINATE GASOLINE TO FUEL REMOTELY PILOTED VEHICLES BECAUSE OF GASOLINE'S LOW FLASH POINT AND RELATIVE UNAVAILABILITY ABOARD SHIPS. THE NAVY REQUIRES ENGINES IN THE 25 TO 35 BHP RANGE, WEIGHING LESS THAN 20 POUNDS, THAT ARE FUELED BY JP-5 AND/OR DIESEL FUEL, THAT WILL START AND OPERATE RELIABLY AT -40 DEG. F AND THAT HAVE REASONABLE FUEL CONSUMPTION CHARACTERISTICS UNDER BOTH CRUISE AND LOITER CONDITIONS. CUYUNA ENGINE COMPANY PROPOSES TO PERFORM RESEARCH: 1. TO EXPLORE THE VARIOUS ALTERNATIVE

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APPROACHES TO DEVELOPING A COMBUSTION PROCESS AND A FUEL SYSTEM FOR SUCH AN ENGINE; AND 2. TO DETERMINE THE FEASIBILITY OF THE VARIOUS APPROACHES; AND 3. TO MAKE A PRELIMINARY DECISION ON THE MOST VIABLE DESIGN APPROACH, AFTER REVIEWING THE ALTERNATIVES WITH THE NAVY; AND 4. TO DEVELOP PRELIMINARY DATA THROUGH ACTUAL TESTS OF PROTOTYPE SYSTEMS TO VERIFY THE DESIGN APPROACH SELECTED; AND 5. TO DEVELOP A PHASE II FULL SCALE DESIGN, DEVELOPMENT AND TEST PLAN.

DAINA
4960 FILLMORE ST NE
COLUMBIA HEIGHTS, MN 55421
CONTRACT NUMBER:
JANIS PUKITE
TITLE:
INTELLIGENT BUILT-IN-TEST MODULE
TOPIC# 249 OFFICE: NATC IDENT#: 24090

FUTURE MILITARY AVIONICS SYSTEMS WILL BE DEPENDING MORE ON BUILT-IN-TEST (BIT) FOR FAULT DETECTION AND ISOLATION TO MEET STRINGENT RELIABILITY, MAINTAINABILITY, AND SUPPORTABILITY GOALS. RECENT EXPERIENCE INDICATES THAT BIT IS NOT MEETING SPECIFICATION REQUIREMENTS IN FIELD OPERATIONS, EXHIBITS A HIGH FALSE ALARM RATE, HAS LOW RELIABILITY, AND IS UNABLE TO ISOLATE FAILURES TO A SINGLE MODULE. AS A RESULT, GOOD UNIT REMOVAL RATE HAS BEEN HIGH, REDUCING SYSTEM AVAILABILITY AND INCREASING MAINTENANCE COSTS. DAINA PROPOSES TO INVESTIGATE THE FEASIBILITY OF AN INNOVATIVE, HIERARCHICALLY-STRUCTURED, MODULAR, AND ADAPTIVE BIT DESIGN CONCEPT COMPATIBLE WITH THE NEXT-GENERATION AVIONICS ARCHITECTURE. THE USE OF STATISTICAL SYSTEM STATE AND PARAMETER ESTIMATION TECHNIQUES WILL BE EVALUATED TO DETERMINE THEIR SUITABILITY FOR DECREASING THE FALSE ALARM RATE. THE PROPOSED APPROACH WILL BE UNIQUE IN THAT IT WILL USE EXTERNAL ENVIRONMENT DATA, ON-LINE RELIABILITY MODELS, SIGNAL FUSION, AND ARTIFICIAL INTELLIGENCE TECHNIQUES TO IMPROVE FAULT DIAGNOSIS. SUCCESSFUL COMPLETION OF THE PHASE I EFFORT WILL PROVIDE FOUNDATION FOR THE PHASE II PROTOTYPE DEVELOPMENT TO FURTHER REFINE THE SELECTED BIT IMPLEMENTATION CONCEPTS.

DAMASKOS INC
PO BOX 469
CONCORDVILLE, PA 19331
CONTRACT NUMBER:
WILLIAM J BITER
TITLE:
LIGHT WEIGHT CONTROLLED EMISSIVITY LAYER WITH INTEGRATED MICROWAV ABSORBER
TOPIC# 32 OFFICE: MARCORPS IDENT#: 24307

SUBMITTED BY

THIS PROPOSAL INVOLVES AN INNOVATIVE COATING WHICH CAN REDUCE THE THERMAL SIGNATURE OF A TARGETS WHILE ALSO ABSORBING MICROWAVES OVER SELECTED FREQUENCY BAND. THIS COATING IS A THIN FILM WHICH CAN BE APPLIED TO A FLEXIBLE PLASTIC FILM AND TO EXTEND SIGNATURE CONTROL OVER A MULTI-SPECTRAL REGION. THE COATING CONSISTS OF A THIN FILM DEPOSITED OVER A THIN RESISTIVE LAYER. THE METAL FILM IS PATTERNED TO FUNCTION AS ANTENNA-LIKE ELEMENTS LOADED BY A RESISTOR WHERE VALUE IS DETERMINED BY THE EXPOSED PORTION OF THE RESISTIVE SHEET UNDERNEATH. THE ADDED WEIGHT AND VOLUME OF THESE LAYERS IS NEGLIGIBLE, SO THE FINAL STRUCTURE WILL BE LIGHT AND WHEN FOLDED, OCCUPY LITTLE VOLUME. IT COULD BE EASILY CARRIED FOR PERSONNEL PROTECTION TO SUPPRESS IR RADIATION WITH ABSORBING AT MICROWAVE FREQUENCIES.

DCS CORP
1055 N FAIRFAX ST
ALEXANDRIA, VA 22314
CONTRACT NUMBER:
CLINTON THACKER
TITLE:
INFRARED TRACKER
TOPIC# 179 OFFICE: NSWC IDENT#: 23881

THE PRIMARY OBJECTIVE OF THIS EFFORT IS TO PERFORM TRADE-OFF STUDIES LEADING TO THE PRELIMINARY DESIGN OF A TE COOLED OR UNCOOLED IR TRACKER. SINCE THE BENEFITS IN LOGISTICS TO BE GAINED BY SUCH A SENSOR MAY REQUIRE A SACRIFICE IN PERFORMANCE, A QUANTITATIVE UNDERSTANDING OF THE NATURE OF THE TRADE-OFFS IS PROPOSED BASED ON COOLER AND DETECTOR TECHNOLOGY. AFTER A BRIEF REVIEW OF CURRENT TE AND UNCOOLED SENSOR TECHNOLOGY, DCS WILL CORRELATE SELECTIONS OF SENSOR DESIGN PARAMETERS TO MATHEMATICAL PREDICTIONS OF FIELD PERFORMANCE. A SUB-TASK THAT WILL GROW OUT OF THE TRADE-OFF STUDIES WILL BE A DETERMINATION OF THE LIMITATIONS TO PERFORMANCE. DCS WILL ALSO CONDUCT AN APPLICATIONS ANALYSIS TO DETERMINE WHEN AND WHERE THESE NEW SENSORS MAY BE MOST ADVANTAGEOUS. THE APPLICATIONS ANALYSIS WILL CONSIDER SUCH FACTORS AS RELIABILITY, MAINTAINABILITY, OPERATING LIFETIME, COOLDOWN TIME, SIZE, WEIGHT, INPUT POWER, ETC. IN ADDITION TO STAND OFF RANGE. FINALLY, DCS WILL SUGGET A PRELIMINARY DESIGN

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FOR A TE OR UNCOOLED IR FIRE CONTROL TRACKER CONSISTING OF DETECTOR MATERIAL, DETECTOR CONFIGURATION, DETECTOR SIZE, DETECTOR OPERATING TEMPERATURE, SPECTRAL PASSBAND, POWER, ETC., AND ESTIMATES OF LIFETIME, MTBF, SIZE, WEIGHT, AND PER UNIT COST.

DEEGAN RESEARCH GR INC
728 BRISTOL FERRY RD
PORTSMOUTH, RI 02871
CONTRACT NUMBER:
THIERRY DEEGAN
TITLE:
COMPOSITE MATERIALS GUIDANCE FOR SUBMARINE
TOPIC# 74 OFFICE: NAVSEA IDENT#: 24639

COMPOSITE MATERIALS OFFER A WIDE RANGE OF ATTRIBUTED THAT CAN IMPROVE THE PERFORMANCE AND REDUCE THE COST OF NEW SUBMARINES. COMPOSITES HAVE NOT YET BEEN USED EXTENSIVELY IN SUBMARINES BECAUSE THERE IS LITTLE EXPERIENCE IN THE SUBMARINE ENGINEERING COMMUNITY ON WHICH TO BASE COMPONENT DESIGN. COMPOSITES, UNLIKE METALS, HAVE A VERY LIMITED BODY OF DESIGN GUIDANCE SPECIFICALLY ORIENTED TO SUBMARINE APPLICATIONS. THE WORK PROPOSED SELECTS FROM THE WIDE RANGE OF AVAILABLE A GROUP THAT OFFERS THE STRENGTH, STIFFNESS, TOUGHNESS, HIGH TEMPERATURE STABILITY, LOW FLAMMABILITY, LIMITED OUTGASSING, AND LOW ABSORBTIVITY THAT ARE NECESSARY FOR SUBMARINE STRUCTURES. COMPOSITE MATERIAL SYSTEM CANDIDATES ARE SELECTED FROM MATRIX AND FIBER COMBINATIONS THAT HAVE A SUBSTANTIAL HISTORY IN STRUCTURAL APPLICATIONS. A SET OF DESIGN PARAMETERS ARE SET FORTH FOR THESE MATERIALS THAT ARE CONSISTENT WITH THE SELECTION METHODS USED CURRENTLY FOR METALS. THESE DESIGN PARAMETERS ARE FORMULATED FROM ENVIRONMENTAL CONDITIONS AND DAMAGE SCENARIOS THAT ARE POSTULATED AS REPRESENTATIVE OF SUBMARINE STRUCTURAL APPLICATIONS. THE NEGATIVE STEREOTYPES OF COMPOSITES ARE SIMILARLY OVERCOME BY DESIGN PARAMETERS THAT GUIDE THE SELECTION OF ADDITIVIES, MATRIX TOUGHENERS AND FIBER ORIENTATIONS THAT ALLOW COMPOSITES TO RESIST FIRE, IMPACT DAMAGE, AND ABRASION.

DEFENSE SYSTEMS INC
7903 WESTPARK DR
McLEAN, VA 22102
CONTRACT NUMBER:
THOMAS J GUARINI
TITLE:
DEEP SEA FLOOR PENETRATOR FOR GEOPHONES
TOPIC# 23 OFFICE: ONT IDENT#: 26362

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AVAILABLE DATA INDICATES THAT PLACING GEOPHONE SENSORS 30-100 METERS IN THE SEABED PROVIDES SUBSTANTIAL IMPROVEMENT IN SIGNAL-TO-NOISE RATIO, TO RECOVER LOST DETECTION RANGE AGAINST QUIETER SUBMARINES. A NEED EXISTS FOR A SEABED PENETRATING SENSOR SYSTEM OPERATING AT LOW FREQUENCIES, CAPABLE OF ON-BOARD SIGNAL PROCESSING AND ABLE TO TRANSMIT ACOUSTIC DETECTION INFORMATION TO THE SURFACE IN REAL OR NEAR REAL TIME. DEFENSE SYSTEMS, INC. (DSI) SUCCESSFULLY DEVELOPED ON DARPA CONTRACT A KINETIC ENERGY PENETRATOR TO PIERCE THROUGH 10 FEET OF POLAR ICE AND DEPOSIT A HYDROPHONE ARRAY, SIGNAL PROCESSOR AND RF TRANSMITTER SYSTEM THAT SURVIVED THE SHOCK OF IMPACT. DSI ALSO DESIGNED AND BUILT THE GEOBUOY, AN A-SIZE, AIR-DROPPED PARTIALLY PENETRATING GEOPHONE PROBE CONTAINING SIGNAL PROCESSOR AND TRANSMITTER. DSI DETERMINED THAT THE SAME TYPE OF KINETIC ENERGY PENETRATOR CAN ALSO PENETRATE THE SEA FLOOR TO MORE THAN 100 FOOT DEPTH AND CONTAIN A GEOPHONE SENSOR AND SIGNAL PROCESSOR. THE DETECTION INFORMATION WOULD BE TRANSMITTED TO A SUBSURFACE FLOAT TO WHICH A SURFACE FLOAT CONTAINING A TRANSMITTER WOULD BE TETHERED TO PROVIDE SATELLITE READOUT OF ACOUSTIC DETECTION INFORMATION. DSI DEVELOPED ESSENTIALLY EVERY SUBSYSTEM ON DIFFERENT PROGRAMS. IN PHASE I, THE SYSTEM WILL BE DESIGNED AND A SUB-SCALE KINETIC ENERGY PENETRATOR WILL BE BUILT TO TEST THE DESIGN PRINCIPLES AND TO SERVE AS A DATA COLLECTION DEVICE FOR COLLECTING SEA FLOOR SOIL CONSTANT DATA. IN PHASE II, A FULL UP SEA FLOOR PENETRATOR WILL BE BUILT AND TESTED.

DELFIN SYSTEMS
1349 MOFFETT PARK DR
SUNNYVALE, CA 94089
CONTRACT NUMBER:
TED L BATHA
TITLE:
UNMANNED AIR VEHICLE SYSTEMS MANAGER
TOPIC# 12 OFFICE: ONT IDENT#: 23479

UNMANNED AIR VEHICLE (UAV) SYSTEMS PROVIDE THE CAPABILITY TO PERFORM DIRECTED FLIGHT PLAN MISSIONS. CURRENTLY, FLIGHT PLANS ARE OPERATOR PREDEFINED AND MAY BE MANUALLY MODIFIED IN FLIGHT OVER A COMMUNICATION LIN. FLIGHT PLAN MODIFICATIONS ARE BASED ON OPERATOR OBSERVATIONS OF UAV PAYLOAD ACCOMPLISHMENTS, TERRAIN, AND AIRCRAFT MEASURED PARA-

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METERS SUCH AS FUEL LEVEL, ALTITUDE AND METEROLOGICAL CONDITIONS. HOWEVER, DURING LONG ENDURANCE UAV MISSIONS, THE COMMUNICATION LINK IS NOT ALWAYS AVAILABLE, THEREBY RESTRICTING FLIGHT PLAN MODIFICATIONS. SEVERE WEATHER, LOW FUEL LEVEL AND OTHER DETRIMENTAL CONDITIONS CANNOT ALWAYS BE ANTICIPATED IN ADVANCE. AN AIRBORNE SYSTEMS MANAGER IS NEEDED TO PROVIDE THE REQUIRED INTELLIGENCE AND SITUATION ASSESSMENT TO DYNAMICALLY RESPOND TO THE CHANGING CONDITIONS. THE GOAL OF THIS PROJECT IS TO PROVE THE TECHNICAL FEASIBILITY OF PROVIDING AN AIRBORNE AUTOMATED CAPABILITY FOR PLANNING/REPLANNING UAV MISSIONS BY DEVELOPING AN EXPERT SYSTEM ARCHITECTURAL DESIGN. THE INTEGRATION OF AN EXPERT SYSTEM INTO A UAV WILL PROVIDE PILOT-LIKE INTELLIGENCE REQUIRED FOR SUCCESSFUL LONG ENDURANCE UAV MISSIONS.

DELTA INFORMATION SYSTEMS INC
300 WELSH RD - HORSHAM BUS CTR/BLDG 3
HORSHAM, PA 19044
CONTRACT NUMBER:
ALAN DEUTERMANN
TITLE:
DATA COMPRESSION TECHNIQUES FOR STORAGE OF REAL-TIME VIDEO IMAGES
TOPIC# 39 OFFICE: SPAWAR IDENT#: 24384

AT THE PRESENT TIME THE NAVY STORES HIGH RESOLUTION TELEVISION SIGNALS ON MAGNETIC MEDIA USING CONVENTIONAL PCM CODING. DELTA PROPOSES TO SYNTHESIZE AND ANALYZE ADVANCED COMPRESSION TECHNIQUES TO REDUCE THE VIDEO BIT RATE. AS A MINIMUM DELTA PROPOSES TO INVESTIGATE THE FOLLOWING TECHNIQUES; PREDICTIVE CODING, TRANSFORM CODING, BIT PLANE CODING, ZERO ORDER TECHNIQUES, AND VECTOR QUANTIZATION.

DEVANEY A J ASSOCS
PO BOX 477
RIDGEFIELD, CT 06877
CONTRACT NUMBER:
ANTHONY J DEVANEY
TITLE:
PROBABILISTIC RADAR INVERSE SCATTERING
TOPIC# 4 OFFICE: ONR IDENT#: 22353

SUBMITTED BY

THE PROBLEM OF ESTIMATING RADAR TARGET PARAMETERS SUCH AS SHAPE, SIZE AND MATERIAL PROPERTIES FROM MONOSTATIC SCATTERING MEASUREMENTS IS FORMULATED WITHIN THE CONTEXT OF STATISTICAL ESTIMATION THEORY AND INVERSE SCATTERING. A BAYESIAN APPROACH TO THIS PROBLEM IS PROPOSED WHERE THE LIKLIHOOD RATIOS BETWEEN MULTIPLE TARGET HYPOTHESES ARE USED TO MAKE AN OPTIMUM TARGET IDENTIFICATION FROM SPARSE SCATTERING DATA. A DETAILED ANALYSIS OF THIS APPROACH IS PRESENTED USING THE POLARIZATION CORRECTED PHYSICAL OPTICS APPROXIMATION FOR CYLINDRICALLY SYMMETRIC, CONDUCTING TARGETS. IT IS SHOWN THAT FOR SUCH TARGETS THE STATISTICAL ESTIMATION PROBLEM BECOMES MATHEMATICALLY EQUIVALENT TO THE LIMITED VIEW PROBLEM TO COMPUTED TOMOGRAPHY WHEN CAST WITHIN A STATISTICAL FRAMEWORK. EXTENSIONS OF THE APPROACH USING ALTERNATIVE FORMULATIONS OF THE INVERSE SCATTERING PROBLEM ARE DISCUSSED.

DIALOG SYSTEMS INC
2842 E GRAND RIVER
EAST LANSING, MI 48823
CONTRACT NUMBER:
DR DAVID J CLOSS
TITLE:
AN AI BASED DECISION SUPPORT SYSTEM FOR SELECTION OF RAMP PROGRAM PARTS CANDIDATES
TOPIC# 54 OFFICE: NAVSUP IDENT#: 22284

THE OBJECTIVES OF THIS PROPOSAL ARE TWOFOLD. FIRST IS TO DEVELOP A DETAILED CONCEPTUAL DESIGN OF AN OPERATIONAL DECISION SUPPORT SYSTEM (DSS) FOR THE SELECTION OF RAMP PROGRAM PARTS CANDIDATES, AND SECONDLY, TO DEVELOP A PROTOTYPE OF THE MORE CRITICAL ELEMENTS OF THE DSS SYSTEM. THE ENVISIONED SYSTEM WILL CONSIST OF AUTOMATED INPUT AND OUTPUT COMMUNICATION LINKS, A DECISION SUPPORT SYSTEM RESIDENT ON APPROPRIATE HARDWARE AND INCLUDING A MENU-DRIVEN INTERFACE, DECISION LOGICS, AND OUTPUT STORAGE CAPABILITIES. EXPERT SYSTEMS PROGRAMMING WILL BE USED IN DEVELOPING SELECTION CRITERIA AND IN EVALUATING CANDIDATE PARTS. IN ADDITION, EXPERT SYSTEMS PROGRAMMING AND NATURAL LANGUAGE PROCESSING CAPABILITIES WILL BE CONSIDERED FOR USE IN EVALUATION OF PARTS CANDIDATE DATA AND FOR REACHING CONCLUSIONS ON THE BASIS OF INCOMPLETE DATA. SEVERAL ASPECTS OF AN

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OPERATIONAL SYSTEM WILL BE STUDIED FOR DETERMINATION OF THE MOST APPROPRIATE APPROACH. SPECIFIC TOPICS TO BE ADDRESSED INCLUDE 1) RULE SELECTION METHODOLOGY, INCLUDING USE OF "INDUCTIVE" AI TOOLS, 2) SELECTION CRITERIA AND POSSIBLE USE OF USER-SET RULES 3) "THRESHOLD" VS. "SPECIFIED" CANDIDATE QUANTITIES FOR SELECTION, 4) THE NEED FOR A THREAT SPECIFIC ANALYSIS CAPABILITY FOR SPECIFIC SYSTEMS AS OPPOSED TO ANALYSIS OF THE FULL UNIVERSE OF PARTS, 5) OPTIONS RELATING TO USE OF EXISTING DATA ONLY VS. MANUAL INTERVENTION WITH MISSING DATA, AND 6) THE NEED FOR A PERIODIC REVIEW AND COMPARISON CAPABILITY.

DIGITAL SYSTEM RESOURCES INC
5723 CENTRE SQ
CENTREVILLE, VA 22020
CONTRACT NUMBER:
ROBERT F POHLER
TITLE:
LINE/FEATURE TRACKING SUITE OF ALGORITHMS
TOPIC# 36 OFFICE: SPAWAR IDENT#: 24362

AN INTEGRATED FACILITY FOR TRACKING MULTIPLE CONTACTS THAT WILL ACCOMMODATE BOTH LOCALIZATION AND CLASSIFICATION INFORMATION AND THAT WILL INCORPORATE BOTH LONG TERM AND DYNAMIC CHARACTERISTICS OF TARGETS. IDENTIFICATION OF APPROPRIATE TECHNOLOGIES, BASELINE ARCHITECTURE DEFINITION, AND RESOURCE UTILIZATION REQUIREMENTS.

DIGITAL SYSTEM RESOURCES INC
5723 CENTRE SQUARE
CENTREVILLE, VA 22020
CONTRACT NUMBER:
RICHARD W CARROLL
TITLE:
WIDEBAND ACTIVE SONAR BEAMFORMING
TOPIC# 37 OFFICE: SPAWAR IDENT#: 24367

BEAMFORMING METHODS IN WHICH THE FAST CONVOLUTION TECHNIQUE IS APPLIED TO EXECUTE MULTICHANNEL TIME DELAY FIR INTERPOLATION

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FILTERING IS THE SUBJECT OF THIS PROPOSAL. THE METHOD OFFERS THE POTENTIAL FOR EXECUTING CERTAIN PRIOR AND POST BEAMFORMING FIR FILTERING OPERATIONS WITHIN THE BEAMFORMER PROCESSING TO ENHANCE OVERALL SYSTEM COMPUTATIONAL EFFICIENCY. TWO FAST CONVOLUTION METHODS BASED ON DIFFERENT APPROACHES TO SYNTHESIZING THE DELAY INTERPOLATION FILTERS ARE PROPOSED FOR PHASE I TRADE-OFF STUDIES. ONE METHOD OFFERS THE POTENTIAL FOR THE DEVELOPMENT OF A PRACTICAL BEAMFORMING STRUCTURE WHICH CAN BE PROGRAMMED TO MAXIMIZE PERFORMANCE IN A WIDE RANGE OF NOISE SOURCE DISTRIBUTIONS. THE METHOD SHOULD PROVIDE FOR ADAPTIVE REJECTION OF SPATIALLY DISCRETE NOISE INTERFERENCE IN THE NEAR TERM. IT ALSO PROVIDES FOR A PRACTICAL SYSTEM TO ADAPTIVELY MAXIMIZE GAIN IN A VARIETY OF COMPLEX, CORRELATED NOISE FIELDS.

DISPLAYTECH INC
2200 CENTRAL AVE
BOULDER, CO 80301
CONTRACT NUMBER:
MARK HANDSCHY
TITLE:
FAST PRODUCIBLE OPTICAL NOVELTY FILTERS MADE WITH FERROELECTRIC LIQUID CRYSTAL PHASE CONJUGATORS
TOPIC# 1 OFFICE: ONR IDENT#: 22302

THE OBJECTIVE OF THE PROPOSED WORK IS TO PRODUCE FAST SWITCHING, LOW-POWER, LOW-COST, HIGH RESOLUTION OPTICAL PHASE CONJUGATORS FOR NOVEL APPLICATIONS TO TRACKING NOVELTY FILTERING. THE OPTICAL PHASE CONJUGATING DEVICE DESCRIBED IN THIS PROPOSAL USES A Si:H PHOTOSENSORS IN THE PHOTODIODE MODE TO MODULATE THE INDEX OF REFRACTION OF A HIGHLY BIREFRINGENT (DELTA N = 0.2) FERROELECTRIC LIQUID CRYSTAL (FLC). THESE DEVICES CAN BE USED TO BUILD NOVELTY FILTERS, AN OPTICAL SYSTEM THAT EXPLOITS THE PHASE REVERSAL PROPERTIES OF THE CONJUGATOR. THE NOVELTY FILTER HAS A DYNAMIC SCENE AS ITS INPUT, AND ITS OUTPUT IS ONLY THE INFORMATION THAT SCENE AS ITS INPUT, AND ITS OUTPUT IS ONLY THE INFORMATION THAT SCENE THAT HAS CHANGED IN THE LAST TIME INTERVAL. THE FLC PHASE CONJUGATOR INCREASE THE BANDWIDTH OF THE NOVELTY FILTER TO OVER 10 MHz FROM THE 120 Hz OBTAINED WITH CONVENTIONAL PHOTOREFRACTIVE PHASE CONJUGATORS.

DIVING UNLIMITED INTERNATIONAL (DUI)
1148 DELEVAN DR
SAN DIEGO, CA 92102
CONTRACT NUMBER:
ROBERT T STINTON
TITLE:
DEVELOPMENT OF A GRADED PNEUMATIC WHOLE BODY G SUIT
TOPIC# 18 OFFICE: ONT IDENT#: 24221

SUBMITTED BY

THE OBJECT IS TO DEMONSTRATE AN APPROACH FOR PNEUMATIC WHOLE-BODY GRADED COUNTER PRESSURE ANTI-G PROTECTION OF A PILOT. THIS EFFORT WOULD BE TO MATCH PNEUMATICALLY THE COUNTER PRESSURE GRADIENT PRODUCED BY A FULL-BODY IMMERSION SUIT. THIS APPROACH SHOULD BE CAPABLE OF PROVIDING LEVELS OF CIRCULATORY SUPPORT AND G PROTECTION APPROACHING THAT OF FULL-BODY IMMERSION SUITS. BECAUSE THIS APPROACH IS PNEUMATIC IT WILL HAVE ADVANTAGES OF BEING LIGHT, EASY TO MOVE IN AND BE COMPARATIVELY EASY TO INTEGRATE INTO AIRCRAFT. THIS ANTI-G SUIT WOULD IDEALLY BE DRIVEN BY A SINGLE PNEUMATIC SOURCE (ANTI-G VALVE). THE GRADED COUNTER PRESSURE WOULD BE ACHIEVED BY USING PNEUMATIC SYSTEMS WITH DIFFERENT PRESSURE TRANSFER EFFICIENCIES. THE PROPOSED GARMENT WOULD TAKE INTO CONSIDERATION THE PILOT COMFORT. BY UTILIZING MATERIALS IN THE PNEUMATIC BLADDERS THAT WOULD ALLOW SOME COOLING THROUGH SWEATING, THERMAL LOADING COULD BE PREVENTED.

DWA COMPOSITE SPECIALTIES INC
21119 SUPERIOR ST
CHATSWORTH, CA 91311
CONTRACT NUMBER:
OLIN HUDSON
TITLE:
DEVELOPMENT OF PLANAR ISOTROPIC NEAR ZERO CTE Gr/Al SPHERICAL REFLECTORS
TOPIC# 163 OFFICE: NSWC IDENT#: 23773

CURRENT ANTENNA REFLECTORS ARE PRIMARILY MADE FROM Gr/EPOXY OR CARBON-CARBON COMPOSITES, AND THESE MATERIAL SYSTEMS OFFER LIMITATIONS IN SURVIVABILITY AND MECHANICAL PROPERTIES. THESE LIMITATATIONS CONTRIBUTE TO POOR PERFORMANCE AND COULD RESULT IN FAILURE OF THE SYSTEM. THIS PROPOSED PROGRAM WILL FABRICATE AND EVALUATE HIGH ANGLE CROSS-PLY GRAPHITE-ALUMINUM SPHERICAL REFLECTORS. THIS WILL BE ACCOMPLISHED UTILIZING THIN-PLY Gr/Al LAYERS KNOWN AS DWG, WHICH WILL PROVIDE EASE OF FABRICATION WITH OPTIMUM MECHANICAL PROPERTIES. TWO SYSTEMS WILL BE EVALUATED, 0 +/- 60 DEG AND 0/90 DEG. IT IS EXPECTED THAT THROUGH THE USE OF THIS MATERIAL PLANAR ISOTROPIC, NEAR ZERO CTE, SPHERICAL REFLECTORS CAN BE PRODUCED. THESE REFLECTORS WILL HAVE THE ADDED BENEFIT OF HIGH STRENGTH AND STIFFNESS AND SURVIVABILITY. DWA HAS EXTENSIVE EXPERIENCE IN THE

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FABRICATION OF Gr-Al COMPOSITES OF VARIOUS SHAPES AND IS HIGHLY QUALIFIED TO UNDERTAKE THIS EFFORT.

DYNA EAST CORP
3201 ARCH ST - 3RD FL
PHILADELPHIA, PA 19104
CONTRACT NUMBER:
DR WILLIAM J FLIS
TITLE:
INSENSITIVE MUNITIONS CONTAINERS
TOPIC# 205 OFFICE: NWC IDENT#: 23149

CURRENT NAVY MUNITION CONTAINERS PROVIDE INADEQUATE PROTECTION FROM A WIDE SPECTRUM OF THREATS. THIS LACK OF PROTECTION MAY RESULT IN DETONATION OF THE SHIP'S MAGAZINE. CURRENT MUNITION CONTAINER DESIGNS MUST MEET REQUIREMENTS FOR VIBRATION, ENVIRONMENT, HANDLING, MAINTAINABILITY, SIZE, AND WEIGHT, BUT DO NOT ADDRESS INSENSITIVE-MUNITION PROGRAM REQUIREMENTS OF PROTECTION AGAINST FRAGEMENT/BULLET IMPACT AND SYMPATHETIC DETONATION. OUR GOAL IS TO REDUCE THE PROBABILITY OF A DETONATION/EXPLOSION OF THE MUNITION WHILE STORED IN THE CONTAINER. A COST-EFFECTIVE AND TIMELY SOLUATION TO THIS TECHNICAL CHALLENGE CAN BE OBTAINED BY INTEGRATING MODERN ARMOR MATERIAL TECHNOLOGY AND SYMPATHETIC DETONATION PROTECTION SYSTEMS INTO THE DESIGN OF THE MUNITION CONTAINERS. BASED ON RECENT TESTING DYNA EAST PERFORMED FOR FMC AND MARTIN MARIETTA, AND PRELIMINARY REVIEW OF THE LITERATURE, SEVERAL INNOVATIVE DESIGNS APPEAR PRO-MISING. BOTH FMC AND MARTIN MARIETTA, PRIME MANUFACTURERS OF THE VLS AND OTHER WEAPON CONTAINER SYSTEMS, HAVE AGREED TO PARTICIPATE IN THE PROPOSAL PROGRAM. THEIR EXPERTISE WILL BE SOUGHT RESPECT TO MANUFACTURABILITY, SYSTEM COST AND GENERAL FEASIBILITY OF APPROACH. IN THIS PROGRAM WE WILL INTEGRATE ADVANCED CALCULATIONAL METHODS AND TEST TECHNIQUES TO PROVIDE THE NAVY WITH NOT ONLY IMPROVED CONTAINER CONFIGURATIONS DESIGNS BUT AN IMPROVED DESIGN METHODOLOGY.

DYNAMIC ANALYSIS & TESTING ASSOCS
2231 FARADAY - STE 103
CARLSBAD, CA 92008
CONTRACT NUMBER:
DR WALT BURKHARD
TITLE:
A DATABASE MANAGEMENT SYSTEM FOR TEMPORAL DATA
TOPIC# 40 OFFICE: SPAWAR IDENT#: 24398

SUBMITTED BY

IN THE PHASE I EFFORT A STUDY OF THE REPRESENTATION AND MANIPULATION SCHEMES FOR LARGE VOLUMES OF TIME DEPENDENT DATA STORED WITHIN DATABASE MANAGEMENT SYSTEMS WILL BE CONDUCTED. THE RELATIONAL DATA MODEL OF CODD WAS NOT DESIGNED TO ACCOMMODATE TIME DEPENDENT DATA AND WHILE MOST COMMERCIAL DATABASE MANAGEMENT SYSTEMS REQUIRE TIME ATTRIBUTES. THIS WILL BE ACCOMPLISHED BY A TECHNICAL LITERATURE SEARCH AND ANALYSIS OF EXISTING WORK ON TEMPORAL DATA MODELS AND PHYSICAL STORAGE SCHEMES. THE FOLLOW-ON PHASE II OF THE PROJECT WILL INVOLVE CREATING AN IMPROVED (IF NOT NEW) TEMPORAL DATA MODEL AS WELL AS PHYSICAL STORAGE SCHEME. WE WILL ALSO DETERMINE THE BEST APPROACH TO BUILDING THE PROTOTYPE VERSION OF THE SYSTEM. FINALLY A PROTOTYPE WILL BE IMPLEMENTED IN PHASE II AS WELL AS MEASUREMENT AND ANALYSIS OF ITS PERFORMANCE.

DYNAMICS TECHNOLOGY INC
21311 HAWTHORNE BLVD - STE 300
TORRANCE, CA 90503
CONTRACT NUMBER:
DR ANDREW B HUANG
TITLE:
EXPENDABLE FIBER OPTIC BATHYPHOTOMETER
TOPIC# 24 OFFICE: ONT IDENT#: 26367

DYNAMICS TECHNOLOGY, INC. (DTI) PROPOSES TO DEMONSTRATE THE FEASIBILITY OF AN EXPENDABLE FIBER OPTIC BATHYPHOTOMETER. THE DISPOSABLE SENSOR CONSISTS OF A PHOTO-CHAMBER ENCASED IN A CONVENTIONAL FREE FALLING FISH-SHAPED BODY. BIOLUMINESCENT SIGNAL GENERATED IS SENSED AND TRANSMITTED FOR ON-BOARD AMPLIFICATION VIA AN OPTICAL FIBER LINE. THE PRINCIPAL ISSUE IS THE EFFECTIVENESS OF SUCH A DEVICE IN GENERATING A DETECTABLE SIGNAL. IN PHASE I, DTI WILL CONSTRUCT A PROTOTYPE PHOTO-CHAMBER. THE TURBULENT PROPERTIES OF THE CHAMBER WILL BE MEASURED. KNOW CONCENTRATION OF BIOLUMINESCENT ORGANISMS WILL BE INJECTED THROUGH THE PROTOTYPE AND EXISTING CALIBRATED BATHYPHOTOMETERS. BY COMPARING THE HYDRODYNAMIC PROPERTIES AND THE RESPECTIVE RESPONSES, THE EXPENDABLE BATHYPHOTOMETER PERFORMANCE CAN BE DETERMINED. THE PHASE I RESEARCH WILL ESTABLISH THE CONCEPT FEASIBILITY AND IDENTIFY THE DEVELOPMENT REQUIREMENTS FOR PHASE II.

SUBMITTED BY

E-TEK DYNAMICS INC
250 EAST DR
MELBOURNE, FL 32904
CONTRACT NUMBER:
J J PAN
TITLE:
LASER DIODE ARRAYS
TOPIC# 69 OFFICE: NAVAIR IDENT#: 24481

SOPHISTICATED OPTICAL C(3)I, LASER COUNTERMEASURE, AND BEAMRIDER WEAPON SYSTEMS REQUIRED THE EFFICIENT INTEGRATION AND PROCESSING OF HIGH PERFORMANCE OPTICAL TRANSMITTING AND RECEIVING SUBSYSTEMS. E-TEK PROPOSES PARALLEL SUBARRAYS INTEGRATION AND SIGNAL/DATA PROCESSING. MULTIAPERTURE SEMICONDUCTOR LASER AND DETECTING PHASED-ARRAYS ARE ALSO PROPOSED FOR VARIOUS SYSTEM APPLICATIONS. THE LASER PHASED-ARRAY CAN PROVIDE HIGH POWER OUTPUT (UP TO SEVERAL THOUSANDS OF KILOWATTS), NARROW BEAMWIDTH (TO LESS THAN 1 uRAD), RAPID BEAM STEERING (LESS THA 1 us), HIGH FREQUENCY MODULATION (HIGHER THAN 10 GHz), AND HEMISPHERICAL COVERAGE. THE OPTICAL RECEIVING PHASED-ARRAY OFFERS SUPERIOR PERFORMANCES OF LOW NOISE, HIGH SENSITIVITY, AND LARGE APERTURE SIZE THAN THE CONVENTIONAL FOCAL PLANE ARRAY. COHERENT DETECTION WILL BE INVESTIGATED AND DESIGNED TO IMPROVE SYSTEM SENSITIVITY AND DYNAMIC RANGE. COMPONENTS/DEVICES WILL BE DESIGNED AND OPTIMIZED, WHICH WILL DIRECTLY LEAD TO PHASE II HARDWARE FABRICATION, VERIFICATION, AND DEMONSTRATION.

EIC LABS INC
111 DOWNEY ST
NORWOOD, MA 02062
CONTRACT NUMBER:
K M ABRAHAM
TITLE:
A Li/SO(2)Cl(2) CELL WITH IMPROVED PERFORMANCE
TOPIC# 183 OFFICE: NSWC IDENT#: 23903

A RESEARCH AND DEVELOPMENT PROGRAM AIMED AT DEVELOPING A

SUBMITTED BY

Li/SO(2)Cl(2) CELL HAVING IMPROVED PERFORMANCE CHARACTERISTICS IS PROPOSED. THIS CELL, WHEN FULL DEVELOPED, IS EXPECTED TO HAVE A SIGNIFICANTLY HIGHER VOLUMETRIC ENERGY DENSITY THAN THE Li/SOCl(2) CELL. IMPROVEMENTS IN THE PERFORMANCE OF THE Li/SO(2)Cl(2) CELL WILL BE ACHIEVED VIA THE FOLLOWING MODIFICATIONS: i. USE OF MIXED ELECTROLYTES, BASED ON LiAlCl(4) SOLUTIONS IN SO(2)Cl(2) AND SOCl(2), OR SO(2)Cl(2) AND SO(2). ii. ADDITION OF PRECURSOR MATERIALS TO MODIFY THE Li ANODE SURFACE FILM AND THUS TO IMPROVE THE STORABILITY OF THE CELL. iii. INCORPORATION OF NEW CATALYSTS TO LOWER CATHODE POLARIZATION, ESPECIALLY AT HIGH RATES OF DISCHARGE.

ELECTRO-OPTICAL SYSTEMS INC
271 GREAT VALLEY PKWY
MALVERN, PA 19355
CONTRACT NUMBER:
WILLIAM H PINKSTON
TITLE:
INFRARED DETECTOR SYSTEM FOR HERO APPLICATIONS
TOPIC# 141 OFFICE: NSWC IDENT#: 23613

SIGNIFICANT RECENT PROGRESS HAS BEEN MADE IN THE DEVELOPMENT OF A FIBER-OPTIC BASED INSTRUMENTATION SYSTEM FOR THE MEASUREMENT OF SUSCEPTIBILITY OF ORDNANCE TO ELECTRO-MAGNETIC RADIATION UTILIZING FLUORIDE GLASS FIBERS AND InSb DETECTORS IN THE 3-5 MICRON WAVELENGTH RANGE. BECAUSE OF THE LOW ENERGY FROM TYPICAL BRIDGEWIRE SYSTEMS IN THIS WAVELENGTH BAND, IT IS DESIRABLE TO EXTEND COVERAGE TO LONGER WAVELENGTHS. THIS REQUIRES BOTH NEW FIBER AND NEW DETECTOR SYSTEMS. THIS PROJECT WILL EVALUATE THE SUITABILITY OF CHALCOGENIDE GLASS FIBERS WHICH NOW UNDER DEVELOPMENT FOR USE IN THE HERO APPLICATION, AND WILL SPECIFICALLY INVESTIGATE THE USE OF HgCdTe DETECTORS WITH WAVELENGTH RESPONSE BETWEEN 5 AND 10 MICRONS. CRITICAL AREAS IN THE EVALUATION WILL BE FIBER TRANSMISSION, MECHANICAL PROPERTIES OF THE FIBER, LOW FREQUENCY NOISE OF THE DETECTOR/ELECTRONICS, SUITABILITY OF SYSTEM FOR USE IN AN EMI-HARDENED, PORTABLE PACKAGE.

ELECTROCHIMICA CORP
20 KELLY CT
MENLO PARK, CA 94025
CONTRACT NUMBER:
DR M EISENBERG
TITLE:
SEAWATER CHEMICALLY ACTIVATED BATTERIES - A METAL OXIDE-ALUMINUM SEAWATER SYSTEM
TOPIC# 231 OFFICE: NCSC IDENT#: 23517

SUBMITTED BY

A VERY HIGH POWER DENSITY METAL OXIDE-ALUMINUM SEAWATER ELECTRO-CHEMICAL BATTERY SYSTEM IS PROPOSED FOR INVESTIGATION IN THE PHASE I PROGRAM AS A BASIS FOR FUTURE DEVELOPMENT OF HIGH POWER BATTERY APPLICATIONS. THIS IS A LOW RISK DEVELOPMENT APPROACH SINCE THE INDIVIDUAL ELECTRODES ARE KNOWN IN OTHER BATTERY SYSTEMS. THE COUPLE COMBINATION AND DESIGN APPROACH ARF NEW. ELECTROCHEMICA CORP. HAS UNDERTAKEN PRELIMINARY TESTS IN THE AgO-Al SYSTEM AND ACHIEVED PROMISING RESULTS DESPITE THE ABSENCE OF ANY TYPE OF FLOW CONTROL. USING THE ELECTRODE TECHNOLOGY AND SPECIAL ALUMINUM ALLOYS, THE AgO-Al SYSTEM WAS FOUND TO BE CAPABLE OF OPERATION TO 700 mA/cm(2) AT 1.3 V (0.9 W/cm(2)) AT TEMPERATURES OF 50 DEG C. IN PHASE I, THE AgO-Al COUPLE WILL BE EVALUATED AT DIFFERENT TEMPERATURES UNDER VARYING SEAWATER ELECTROLYTE ADDITIONS, THE ANODE FARADAIC EFFICIENCY DETERMINED FOR DIFFERENT Al ALLOYS AND AN INITIAL CELL WILL BE CONSTRUCTED AND STUDIED UNDER RELEVANT DISCHARGE CONDITIONS.

ELECTROSYNTHESIS CO INC
PO BOX 430
EAST AMHERST, NY 14051
CONTRACT NUMBER:
DR NORMAN L WEINBERG
TITLE:
NOVEL APPROACHES TO THE SYNTHESIS OF FLUORODINITROMETHANE AND FLUORODINITROETHANOL
TOPIC# 150 OFFICE: NSWC IDENT#: 23688

NOVEL CHEMICAL AND ELECTROCHEMICAL METHODS OF SYNTHESIS OF FLUORODINITROMETHANE AND FLUORODINITROETHANOL ARE PROPOSED. THESE COMPOUNDS ARE USEFUL AS PLASTICIZERS FOR HIGH-ENERGY EXPLOSIVES AND PROPELLANTS, AND AS INTERMEDIATES IN THE SYNTHESIS OF OTHER HIGH-ENERGY MATERIALS, INCLUDING POLYMERS. THE PROPOSED SYNTHETIC APPROACHES ARE POTENTIALLY SAFER AND MORE EFFICIENT THAN PREVIOUS METHODS, AND UTILIZE INEXPENSIVE STARTING MATERIALS. THE METHODS DEVELOPED CAN BE READILY SCALED UP TO PRODUCE LARGE QUANTITIES OF MATERIAL. PHASE II WILL EXTEND THESE STUDIES TO DEVELOP LOW COST METHODS OF SYNTHESIS FOR A WIDE RANGE OF HIGHLY ENERGETIC MATERIALS CONTAINING SIMILAR FUNCTIONALITY.

ELTECH RESEARCH CORP
625 EAST ST
FAIRPORT HARBOR, OH 44077
CONTRACT NUMBER:
MARILYN J NIKSA
TITLE:
THE ALUMINUM/AIR FUEL CELL: AN ADVANCED POWER SOURCE FOR AUV'S WITH HIGHER ENERGY/POWER DENSITY
TOPIC# 21 OFFICE: ONT IDENT#: 26335

SUBMITTED BY

A CONCEPTUAL DESIGN OF AN ALUMINUM/AIR FUEL CELL TO POWER AN AUV WILL BE DEVELOPED BY ELTECH RESEARCH CORP., A HIGH TECH ELECTROCHEMICAL R&D COMPANY, AND APPLIED REMOTE TECHNOLOGY, INC., AN UAV ENGINEERING CONSULTING FIRM. THE OPERATIONAL, MAINTENANCE, AND RECHARGE REQUIREMENTS WILL BE DETAILED, AND THE ISSUES OF SAFETY AND MODULARITY WILL BE ADDRESSED. PERFORMANCE PROJECTIONS OF THE Al/AIR FUEL CELL INTEGRATED INTO THE ART XP-21 AUV TESTBED VEHICLE WILL BE MADE. THE KEY TECHNICAL, OPERATIONAL, AND ECONOMIC ISSUES WILL BE EVALUATED BY BOTH ELTECH AND ART. A PLAN FOR THE EVENTUAL FABRICATION AND TESTING ON ART'S XP-21 TESTBED OF A WORKING PROTOTYPE IN PHASE II WILL BE INCLUDED WITH THE CONCEPTUAL DESIGN. THE Al/AIR FUEL CELL PROVIDES ELECTRICAL ENERGY BY THE DISSOLUTION OF AN ALUMINUM ANODE AND THE REDUCTION OF OXYGEN (AIR) AT THE CATHODE. IT IS REFUELABLE BY REPLACING THE ALUMINUM ANODES, ADDING WATER, AND REMOVING BY-PRODUCT ALUMINATE. THE Al/AIR FUEL CELL HAS A HIGHER ENERGY/POWER DENSITY THAN ANY OTHER FUEL CELL OR SECONDARY BATTERY, AND, AS SUCH, SHOULD BE IDEALLY SUITED FOR AUV APPLICATIONS.

ENERGY COMPRESSION RESEARCH CORP
910 CAMINO DEL MAR - STE A
DEL MAR, CA 92014
CONTRACT NUMBER:
OVED ZUCKED
TITLE:
MICROWAVE ANTENNA DESIGN
TOPIC# 46 OFFICE: SPAWAR IDENT#: 24435

THIS PROPOSAL DESCRIBES A PHASED ARRAY ANTENNA DESIGN RADIATING TEN TERRAWATT FROM A NOMINAL SIX METER APERTURE FOR SHORT PULSES AT SEA LEVEL, HAVING 80 dB SIDELOBE SUPPRESSION, AND STEERABLE OVER 120 DEGREES AND A 90 DEGREE AZIMUTH AND ELEVATION RESPECTIVELY.

ENGINEERING RESEARCH ASSOCS
1595 SPRINGHILL RD
VIENNA, VA 22180
CONTRACT NUMBER:
LAIRD MOFFETT
TITLE:
IMPROVED ELECTRONIC SUPPORT MEASURES SENSOR CAPABILITIES
TOPIC# 244 OFFICE: NOSC IDENT#: 24167

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THE DETECTION AND CLASSIFICATION OF RADIO FREQUENCIES AT EXTENDED RANGES IS AN IMPORTANT ADJUNCT TO AN ELECTRONIC SUPPORT MEASURES ALERTMENT ROLE. WITH TODAY'S SOPHISTICATED SIGNAL FORMATS THE CHARACTERISTICS OF SIGNALS CHANGE ON A PULSE-BY-PULSE BSIS. THIS PROPOSAL PRESENTS A TECHNIQUE WHEREBY THE FREQUENCY CHARACTERISTICS OF EACH PULSE AT EXTENDED RANGES (LOW POWER LEVELS) CAN BE MEASURED VERY ACCURATELY TO PROVIDE PLATFORM TO EMITTER CORRELATION. THE METHOD OF INVESTIGATION IS TO MODIFY AN EXISTING DIGITAL SIGNAL PROCESSING MODEL TO SIMULATE THE FINE FREQUENCY MEASUREMENT SYSTEM (FFMS) ARCHIETECTURE. THIS MODEL WILL BE USED TO INVESTIGATE THE ALGORITHMS REQUIRED TO PERFORM THE ACCURATE FREQUENCY MEASUREMENT. FROM THE SIMULATION RESULTS IN BASELINE DESIGN OF THE FFMS WILL BE DEVELOPED. THE PROPOSAL DISCUSSES IN DETAIL THE FFMS CONCEPT, THE SPECIFIC OBJECTIVES OF THE PROJECT AND THE METHOD OF INVESTIGATION.

ENGINEERING RESEARCH ASSOCS INC
1595 SPRINGHILL RD
VIENNA, VA 22180
CONTRACT NUMBER:
DAVID NOBLE
TITLE:
ANTI-SHIP TARGETING USING TACTICS
TOPIC# 195 OFFICE: NSWC/JCMPO IDENT#: 22217

THIS PROPOSAL OUTLINES HOW THE PERFORMANCE OF THE TRACKER USED FOR ANTI-SHIP TARGETING BY THE TOMAHAWK MISSILE CAN BE IMPROVED BY INFORMATION ABOUT HOSTILE OBJECTIVES, ABOUT TACTICS TO ATTAIN THESE OBJECTIVES, AND ABOUT CHARACTERISTICS TYPICAL OF PLATFORMS PARTICIPATING IN THESE TACTICS. THE PROPOSED APPROACH TAKES ADVANTAGE OF A TACTICS ASSESSMENT SYSTEM CURRENTLY UNDER DEVELOPMENT BY ERA FOR THE NAVY, AND ALSO TAKES ADVANTAGE OF THE BROAD RANGE OF INPUT ACCEPTED BY THE CURRENT TRACKER USED FOR ANTI-SHIP TARGETING. THE PROPOSED WORK INVESTIGATES THE MEANS TO PROCESS THE OUTPUT FROM THE TACTICS ASSESSMENT SYSTEM FOR USE BY THE TRACKER, AND DEMONSTRATES TRACKER IMPROVEMENTS REALIZABLE FROM DIFFERENT TYPES OF TACTICS ASSESSMENT OUTPUT.

ENTROPIC SPEECH INC
600 PENNSYLVANIA AVE SE - STE 202
WASHINGTON, DC 20003
CONTRACT NUMBER:
JOHN SHORE
TITLE:
PROCESSING OF TRANSIENT SIGNALS
TOPIC# 218 OFFICE: NUSC IDENT#: 23065

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THE NAVAL UNDERWATER SYSTEMS CENTER HAS A CLEAR NEED FOR DETECTING AND CLASSIFYING ACOUSTIC SIGNALS. THESE SIGNALS MAY REPRESENT SHIPPING TRAFFIC, NATO NAVAL ACTIVITIES,, BIOLOGICALLY GENERATED SIGNALS (SUCH AS PRODUCED BY WHALES AND OTHER MARINE LIFE), ENVIRONMENTALLY GENERATED SIGNALS (CRACKING OF GLACIERS, ETC.), OR HOSTILE MILITARY ACTIVITY. SOME OF THESE SIGNAL SOURCES CAN BE MODELED FAIRLY WELL AS PRODUCING STATIONARY SIGNALS, AND THUS STANDARD FOURIER TRANSFORM METHODS CAN BE APPLIED SUCCESSFULLY. MANY SOURCES, HOWEVER, PRODUCE SIGNALS THAT ARE SHORT IN DURATION AND CHANGING WITH TIME, AND IT IS ON THESE SIGNALS THAT HELP IS NEEDED. WE PROPOSE TO AUTOMATE THIS DETECTION AND CLASSIFICATION OF TRANSIENT SIGNAL SOURCES BY EXTENDING AND IMPROVING METHODS THAT WE PREVIOUSLY HAVE APPLIED SUCCESSFULLY TO THE SPEECH AND SPEAKER RECOGNITION PROBLEMS. SPEECH IS A TRANSIENT SIGNAL; THE SAME SPEECH SOUND IS ALSO PRODUCED DIFFERENTLY BY DIFFERENT SPEAKERS. YET OUR METHODS ALLOW US TO IDENTIFY SOUNDS OR WORDS INDEPENDENTLY OF THE SPEAKER. WE BELIEVE THAT ACOUSTIC SOURCE IDENTIFICATION CAN BE LARGELY AUTOMATED BY USING THESE METHODS, WHICH GREW OUT OF FUNDAMENTAL RESEARCH ON INFORMATION THEORY AND ENTROPIC SIGNAL PROCESSING.

EPOCH ENGINEERING INC
806 W DIAMOND AVE
GAITHERSBURG, MD 20878
CONTRACT NUMBER:
EUGENE H BEACH
TITLE:
SELF-DEPLOYING LARGE ARRAY STRUCTURES
TOPIC# 20 OFFICE: ONT IDENT#: 26320

A MAJOR PROBLEM FOR SURFACE SHIP ASW IS THE DETECTION AND LOCALIZATION OF QUITE ENEMY SUBMARINE TARGETS WHICH ARE OR MAY BE APPROACHING MISSILE-LAUNCH RANGE OF A BATTLE GROUP AND WHERE OWN-SHIP, SELF-NOISE OR SONAR CONDITIONS PRECLUDE THE USE OF SHIP SONARS. ONE TECHNIQUE IS TO DROP A PATTERN OF SONOBUOYS FROM LAMPS HELICOPTERS OR OTHER AIRCRAFT IN THOSE AREAS WHERE THERE HAS BEEN SOME INDICATION OF A POSSIBLE CONTACT. IT WOULD BE ADVANTAGEOUS IF A SINGLE BUOY COULD BE DROPPED, WHICH IN TURN WOULD DEPLOY A LARGE TWO OR THREE DIMENSIONAL ARRAY OF SUFFICIENT APERTURE TO PERMIT THE COMPUTATION OF

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TARGET BEARING, DEPTH AND PERHAPS RANGE WITH USEFUL ACCURACY. THE PURPOSE OF THE PROPOSED STUDY IS TO GENERATE A SCHEME OR SCHEMES FOR SUCH A SELF-DEPLOYING ARRAY WHICH HAS THE REQUISITE APERTURE AND STRUCTURAL RIGIDITY.

FAILURE ANALYSIS ASSOCS
PO BOX 51470 - 2225 E BAYSHORE RD
PALO ALTO, CA 94303
CONTRACT NUMBER:
JOSEPH A DiPAOLANTONIO
TITLE:
MATHEMATICAL MODEL FOR PREDICTING HELICOPTER GEARBOX FAILURE MODE
TOPIC# 248 OFFICE: NATC IDENT#: 24076

THIS SBIR POSES A COMPLEX AND MULTIFACETED PROBLEM; THE STATISTICAL ANALYSIS OF REAL-LIFE OVERHAUL AND FAILURE DATA, AND THE DEVELOPMENT OF A MATHEMATICAL MODEL OF THE MOST CRITICAL FAILURE PROCESSES. THIS INVOLVES REQUIRED EXPERTISE IN THE ANALYSIS OF INCOMPLETE, NON-HOMOGENEOUS DATA SETS, THE DEVELOPMENT OF RELIABILITY STATISTICAL METHODS AND IN THE FAILURE PHENOMENOLOGY OF ELASTOHYDRODYNAMIC CONTACTS AND ROTATING MECHANISMS. PHASE I WILL INVOLVE CONDUCTING AN INVOLVED DATA SURVEY, VALIDATING THE PROBLEM, VERIFYING THE PROPOSED LIFE-DATA ANALYSIS TECHNIQUES AND DEVELOPING AN UNDERSTANDING OF THE FAILURE PROCESSES OF INTEREST, LEADING TO A PRELIMINARY MATHEMATICAL ALGORITHM FOR MODELING OF THE FAILURE PROCESS OF INTEREST.

FATIGUE TECHNOLOGY INC
150 ANDOVER PARK W
SEATTLE, WA 98188
CONTRACT NUMBER:
ERIC T EASTERBROOK
TITLE:
LOW CYCLE FATIGUE ENHANCEMENT OF BLADE ATTACHMENT
TOPIC# 236 OFFICE: NAPC IDENT#: 25242

THIS PROGRAM WILL DETERMINE THE POTENTIAL FOR LIFE IMPROVEMENT, WEIGHT REDUCTION, AND HIGHER LOAD BEARING CAPABILITY OF AIRCRAFT

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ENGINE COMPONENTS MADE FROM EMERGING MATERIALS AND MANUFACTURING TECHNIQUES. THE GEOMETRIES TO BE STUDIED, BUT NOT LIMITED TO, ARE BOLT HOLES, BLADES, BLADE ATTACHMENTS, CUTOUTS, AND SCALLOPS. TESTING WILL BE CONSTANT AMPLITUDE CRACK GROWTH UNDER BOTH AMBIENT AND HIGH TEMPERTURE ENVIRONMENTS. SPECIMENS WILL HAVE INITIAL CRACK SIZES CONSISTANT WITH THE REQUIREMENTS OF THE PROPOSED ENGINE STRUCTURAL INTEGRITY PROGRAM (ENSIP). MATERIAL TO BE TESTED WILL BE Ti 6Al-2Sn-4Zr-2Mo. OTHER EVALUATIONS TO BE PERFORMED INCLUDE QUALITATIVE PHOTOELASTIC ANALYSIS AND MEASUREMENTS OF DEFORMATIONS DUE TO THE FATIGUE ENHANCEMENT PROCESSES STUDIED. USE OF THE PATENTED SPLIT SLEEVE COLD EXPANSION (Cx) SYSTEM AND SYSTEM VARIATIONS WILL BE THE METHOD BY WHICH BENEFICIAL RESIDUAL COMPRESSIVE STRESSES ARE IMPARTED INTO THE METAL AROUND STRESS CONCENTRATORS. THE RESIDUAL STRESSES LOWER THE EFFECTIVE TENSILE STRESSES WHICH PROPAGATE CRACKS. THE PROCESS HAS BEEN USED WIDELY FOR LIFE EXTENSION OF NEW AND IN-SERVICE AIRFRAMES. THESE SYSTEMS HAVE NOT BEEN FULLY EVALUATED FOR GAS TURBINE ENGINE APPLICATIONS.

FEI CO
19500 NW GIBBS DR - STE 100
BEAVERTON, OR 97006
CONTRACT NUMBER:
DR LYNWOOD W SWANSON
TITLE:
DEVELOPMENT AND EVALUATION OF LONG LIFE LIQUID METAL ION SOURCES OF BORON AND ARSENIC
TOPIC# 238 OFFICE: NOSC IDENT#: 24131

THE RESEARCH OUTLINES IN THE PROPOSAL DEALS WITH HIGH BRIGHTNESS, LIQUID ALLOY ION SOURCES (LAIS) THAT CAN BE USED IN MASS SEPARATED FOCUSING COLUMNS TO PROVIDE SUBMICRON FOCUSED BEAMS OF SPECIFIED ION SPECIES. IN PARTICULAR WE PROPOSE TO DEAL WITH THOSE LAIS THAT PROVIDE DOPANT IONS OF As AND B THAT CAN BE EMPLOYED IN MASKLESS IMPLANTATION OF SILICON BASED IC DEVICES. THE SPECIFIC OBJECT OF THE PHASE I RESEARCH IS TO BRING ABOUT THE DEVELOPMENT OF INCREASED LIFETIME AND EMISSION PERFORMANCE OF LAIS THAT PROVIDE B(+) AND As (+2) DOPANT IONS. TO THIS END THE RESEARCH WILL FOCUS ON NEW CONCEPTS IN THE LAIS CONFIGURATION SO THAT NOT ONLY IMPROVEMENT IN SOURCE PERFORMANCE WILL BE REALIZED BUT, HOPEFULLY, A MORE VERSATILE

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LAIS GEOMETRY WILL BE DEVELOPED THAT WILL BE COMPATIBLE WITH MANY ALLOYS. THE SPECIFIC SOURCE CHARACTERISTICS TO BE MEASURED ARE SOURCE LIFE, ANGULAR INTENSITY AND ENERGY SPREAD OF THE VARIOUS BEAM SPECIES.

FLOW RESEARCH INC
21414 - 68TH AVE S
KENT, WA 98032
CONTRACT NUMBER:
PETER H -T LIU
TITLE:
DEVELOPMENT OF A SCANNING PULSED DIODE LASER DOPPLER VELOCIMETER FOR FLOW MEASUREMENTS IN COASTAL AND MARINE ENVIRONMENTS
TOPIC# 3 OFFICE: ONR IDENT#: 22337

A SCANNING, PULSED DIODE LASER DOPPLER VELOCIMETER (DLDV/SP) WILL BE DEVELOPED FOR FLOW MEASUREMENTS IN AIR AND WATER, PARTICULARY COASTAL WATERS AND THE MARINE ATMOSPHERIC BOUNDARY LAYER. THE DLDV/SP, BASED ON A FIELD-PROVEN DLDV FOR OCEAN DEPLOYMENT UNDER ICE FLOWS, WILL BE DESIGNED FOR ON-AXIS BACKSCATTER OPERATION. IN A PULSED MODE, THE DIODE LASER WILL GENERATE INSTANTANEOUS LASER POWER IN THE TENS OF WATTS, WHICH IS NECESSARY FOR THE SCANNING, BACKSCATTER OPERATION. TWO CRITICAL ISSUES THAT MUST BE RESOLVED ARE THE EXTREMELY SHORT PULSE WIDTH (200 TO 500 ns) AND THE RELATIVELY LARGE SPECTRAL WIDTH (ABOUT 3.5 nm). TO RESOLVE THESE ISSUES, WE PROPOSE, RESPECTIVELY, THE INCORPORATION OF AN OPTICAL MODULATION SCHEME TO CREATE A "RUNNING" FRINGE PATTERN AND THE IMPLEMENTATION OF OPTICAL FILTERING OR AN ETALON. THE DLDV/SP WILL MEASURE PROFILES OF MEAN AND FLUCTUATING FLOW COMPONENTS AS WELL AS SHEAR FLOW. BECAUSE LASER ANEMOMETRY IS ALSO CAPABLE OF MEASURING PARTICLE SIZE DISTRIBUTION AND NUMBER DENSITY, SIMULTANEOUS MEASUREMENTS OF PARTICLE SPEED AND SIZE DISTRIBUTION AND NUMBER DENSITY MAY BE MADE WITH THE DLDV/SP. A ZOOM OPTICAL SYSTEM WILL BE DESIGNED FOR SCANNING THE FOCAL VOLUME, WITH RANGES ON THE ORDER OF 10 m IN AIR AND 1 m IN WATER. DURING PHASE I, A TEST MODEL WILL BE DESIGNED, ASSEMBLED, AND TESTED TO DETERMINE THE FEASIBILITY OF THE PROPOSED DEVELOPMENT.

FLOW RESEARCH INC
21414 - 68TH AVE S
KENT, WA 98032
CONTRACT NUMBER:
DR JACK J KOLLE'
TITLE:
DEEP OCEAN SEISMOMETER IMPLANTATION SYSTEM (DOSIS)
TOPIC# 23 OFFICE: ONT IDENT#: 26363

SUBMITTED BY

WE PROPOSE TO DETERMINE THE FEASIBILITY OF A SOFT LANDING, HYDRAULICALLY-POWERED PENETRATOR FOR DEPLOYING SEISMOMETERS AT DEPTHS OF 30 TO 100 METERS BENEATH THE SURFACE OF THE DEEP OCEAN BOTTOM. SEISMOMETERS DEPLOYED AT THESE DEPTHS WILL BE BETTER COUPLED TO THE SEDIMENT AND WILL BE ISOLATED FROM VLF/ULF NOISE SIGNALS ASSOCIATED WITH SURFACE WAVES AT THE SEDIMENT/WATER INTERFACE AND FROM CURRENT INDUCED NOISE. THE DEPLOYMENT SYSTEM WILL BE A COMPACT, SELF-CONTAINED PACKAGE WHICH CAN BE DEPLOYED BY SHIP OR AIRCRAFT. THE PENETRATOR SYSTEM WILL IMPLANT A VERTICALLY-ORIENTED, CONVENTIONAL 3-AXIS SEISMOMETER PACKAGE TO A DEPTH OF UP TO 100 METERS. THE TWO PRIMARY OBJECTIVES OF THE WORK ARE TO OBSERVE THE PENETRATION RATE CAPABILITY OF A 20 cm DIAMETER PROTOTYPE PENETRATOR AND TO DETERMINE THE SIZE, LOGISTICS AND COST OF A COMPLETE DEEP OCEAN DEPLOYMENT SYSTEM. A PROTOTYPE PENETRATOR WILL BE FABRICATED AND TESTED ON-SHORE. A PRELIMINARY DESIGN FOR THE COMPLETE SYSTEM WILL BE PREPARED BASED ON THE ONSHORE TEST RESULTS. COST ESTIMATES AND DEPLOYMENT REQUIREMENTS WILL BE PREPARED.

FORESIGNT ENGINEERING
134 JOURNEY'S END
WALNUT CREEK, CA 94545
CONTRACT NUMBER:
VINCENT H HOMER JR
TITLE:
SUPPRESSING BLAST ENERGY FROM SHIPBOARD EXPLOSIONS BY AQUEOUS FOAM/HIGH STRENGTH MESH CURTAINS
TOPIC# 83 OFFICE: NAVSEA IDENT#: 24529

THIS PROPOSAL DEFINES A FEASIBILITY STUDY TO EVALUATE AQUEOUS FOAMS TO PROVIDE A SINGLE SYSTEM CAPABLE OF SUPPRESSING BLAST EFFECT AND FIRES WITHIN NAVAL VESSELS. AQUEOUS FOAMS HAVE BEEN PROVEN TO SUPPRESS EXPLOSIVE BLAST ENERGY. THE USE OF HIGH-STRENGTH, HEAT-RESISTANT MESH CURTAINS IS PROPOSED TO ENHANCE BLAST DAMAGE MITIGATION. THE USE OF HALON 1301 (BROMOTRIFLUOROMETHANE) AS A FOAMING AGENT WILL BE EVALUATED IN FOLLOW-ON TESTING FOR ITS ABILITY TO PROVIDE SUSTAINED SUPPRESSION OF COMBUSTION REFLASH AND BUILDUP OF EXPLOSIVE VAPORS. HIGH-STRENGTH MESH BARRIERS WOULD PROVIDE THREE MODES OF BLAST ENERGY DISSIPATION: (1) CONVERTING SHOCK FRONT ENERGY

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INTO HEAT FROM SUPERSONIC GAS FORCED THROUGH SMALL CROSS-SECTIONS; (2) CONVERTING GAS ENERGY PASSING THROUGH ONE OR MORE MESH BARRIERS INTO HIGHLY TURBULENT FLOW...

FORMATION INC
823 E GATE DR
MOUNT LAUREL, NJ 08054
CONTRACT NUMBER:
P KUPHAL
TITLE:
MASS MEMORY TECHNOLOGY
TOPIC# 107 OFFICE: NAVSEA IDENT#: 24855

THIS PROJECT PROVIDES RECOMMENDATIONS REGARDING FUTURE MASS MEMORY IMPROVEMENTS TO THA AN/SQQ-89 SURFACE SHIP ASW COMBAT SYSTEM. AREAS OF IMPROVEMENT INCLUDE COST, VOLUME, WEIGHT, MEMORY CAPACITY, READ/WRITE TIME, SEEK AND LATENCY MINIMIZATION, AND MULTI-COMPUTER ACCESS. METHODS OF ACHIEVING FASTER ACCESS TIME ARE EXPLORED IN DEPTH ALONG WITH TECHNIQUES FOR PROVIDING MULTICOMPUTER ACCESS TO A COMMON DATABASE. A FEASIBILITY STUDY OF USING LARGE QUANTITIES OF RANDOM ACCESS MEMORY AS A "DISK LIKE" FUNCTION IS INCLUDED. THE FEASIBILITY STUDY INCLUDES COST, RELIABILITY, AND SPEED TRADEOFFS FOR DATA WHICH CAN BE STORED IN VOLATILE MEMORY. COMPUTER MODELLING WILL BE THE BASIS OF COMPARISON. THE PHASE I EFFORT IS PRIMARY ANALYTICAL IN NATURE. PERFORMANCE IMPEDIMENTS WITHIN THE UYH-3 DISK SUBSYSTEM AS APPLIED TO THE AN/SQQ-89 SYSTEM WILL BE QUANTIFIED SO THAT RECENT AND PROJECTED ADVANCES IN TECHNOLOGY CAN BE EXPLORED FOR PERFORMANCE IMPROVEMENT. THE RESULTS WILL LEAD TO RECOMMENDATIONS FOR ENHANCEMENT. THESE RECOMMENDATIONS WILL BE THE BASIS FOR A PHASE II PROPOSAL. THE PHASE II EFFORT WILL PROVIDE PROTOTYPE HARDWARE REALIZATION OF THE ENHANCEMENTS AND DEMONSTRATION OF THE VALIDITY OF THE ANALYTICAL PREDICTION.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
RICHARD W LUSIGNEA
TITLE:
INTERFACE MODIFIED GLASS FIBER/THERMOPLASTIC MATRIX COMPOSITE
TOPIC# 9 OFFICE: ONR IDENT#: 22390

SUBMITTED BY

GLASS FIBER-REINFORCED THERMOPLASTIC RESIN COMPOSITES CURRENTLY SHOW UNSATISFACTORY PERFORMANCE AS A RESULT OF INADEQUATE ADHESION AT THE FIBER/RESIN INTERFACE. INTERFACE MODIFICATION BY APPLICATION OF HIGH TEMPERATURE POLYIMIDE RESIN COATINGS TO GLASS FIBERS WILL GREATLY IMPROVE GLASS FIBER/THERMOPLASTIC RESIN INTERACTION. THIN, CONTINUOUS, POLYIMIDE COATINGS WILL BOND TENACIOUSLY TO GLASS FIBER SURFACES AND INTERACT STRONGLY WITH THE THERMOPLASTIC RESIN MATRIX. THE POLYIMIDE FILMS WILL ENCAPSULATE INDIVIDUAL GLASS FIBERS, PROTECTING THEM FROM ABRASION DAMAGE DURING CONSOLIDATION AND MOISTURE INCURSION UNDER HOT/WET CONDITIONS. PHASE I OF THIS PROGRAM WILL DEMONSTRATE THE FEASIBILITY OF PRODUCING POLYIMIDE RESIN INTERFACE-MODIFIED GLASS FIBER/THERMOPLASTIC RESIN COMPOSITES THAT ARE MORE THAN 40 PERCENT HIGHER IN SHEAR STRENGTH, COMPRESSIVE STRENGTH AND RESISTANCE TO FATIGUE DEGRADATION AND RESISTANT TO HOT/WET CONDITIONS. THIS WILL RESULT FROM IMPROVED GLASS FIBER/THERMOPLASTIC MATRIX INTERACTION. MICROSCOPIC AND INFRARED ANALYSIS OF POLYIMIDE-COATED GLASS FIBERS AND THEIR COMPOSITES WILL PROVIDE INSIGHT INTO THE MECHANISM OF INTERFACE MODIFICATION. IN PHASE II WE WILL OPTIMIZE THE PROCESS AND PRODUCE, THICK, INTERFACE-MODIFIED GLASS FIBER/THERMOPLASTIC RESIN MATRIX COMPOSITES FOR EXTENSIVE CHARACTERIZATION.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
BRUCE NAPPI
TITLE:
EXPENDABLE SEA SURFACE TEMPERATURE MEASUREMENT DEVICE
TOPIC# 78 OFFICE: NAVSEA IDENT#: 24666

TODAY'S FIGHTING SHIPS RELY HEAVILY ON RADAR AND SONAR TO KEEP THEM OUT OF TROUBLE. ALTHOUGH SOPHISTICATED, THESE SYSTEMS STILL NEED DATA ON ENVIRONMENTAL CONDITIONS FOR PROPER OPERATION. FOR THIS REASON, IT IS IMPORTANT TO KNOW THE TEMPERATURE OF THE SEA SURFACE IN THE VICINITY OF A SHIP THAT COULD BE THE TARGET OF ENEMY FIRE. AT PRESENT, THERE IS NO GOOD WAY TO MAKE THIS MEASUREMENT. THIS PROPOSAL PRESENTS A PLAN TO DEVELOP A SEA-SURFACE TEMPERATURE MEASUREMENT SYSTEM RESPONSIVE TO THE NAVY'S NEEDS. THE SYSTEM

SUBMITTED BY

CONSISTS OF THREE PRINCIPAL SUBSYSTEMS: AN EXPENDABLE BUOY WHICH TRANSMITS SURFACE TEMPERATURE DATA TO THE SHIP; A LAUNCHER WHICH EJECTS BUOYS WELL AWAY FROM THE SIDE OF THE SHIP; AND A SHIPBOARD RECEIVER/DATALOGGER WHICH RECEIVES, STORES AND DISPLAYS THE TEMPERATURE DATA FROM MULTIPLE BUOYS. IN PHASE I, A PROTOTYPE SYSTEM (BUOY AND LAUNCHER) WILL BE DESIGNED AND BUILT. TO MINIMIZE DEVELOPMENT COST AND RISK, THE BUOY DESIGN WILL INCORPORATE KEY ELEMENTS OF TECHNOLOGY AND HARDWARE FROM AN EXISTING EXPENDABLE BATHYTHERMOGRAPH. THE SYSTEM WILL BE EVALUAGED THROUGH A SERIES OF INITIAL TESTS. IN PHASE II, ANY REQUIRED DESIGN REFINEMENT WILL BE UNDERTAKEN AND THE SYSTEM WILL BE TESTED EXTENSIVELY PRIOR TO PRODUCTION-ENGINEERING FOR QUANTITY MANUFACTURE.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
LESLIE S RUBIN
TITLE:
SHIPBOARD AUTOMATED WATER QUALITY MONITOR
TOPIC# 93 OFFICE: NAVSEA IDENT#: 24718

NAVY VESSELS PROCESS, UTILIZE AND DISCHARGE NUMEROUS WATER STREAMS WITH VARYING QUALITY/CHEMISTRY REQUIREMENTS. BECAUSE A SOUND SHIP-BOARD WATER SYSTEM IS VITAL, COMPREHENSIVE TREATMENT AND CONTROL PROCEDURES HAVE BEEN ESTABLISHED BY THE NAVY. HIGH PRIORITY IS GIVEN TO THEIR IMPLEMENTATION AND MAINTENANCE. WATER ANALYSIS IS AN IMPORTANT ASPECT OF THESE QUALITY CONTROL PROCEDURES. SEVERAL LENGTHY AND OFTEN COMPLEX "WET CHEMISTRY" ANALYSIS PROCEDURES ARE CURRENTLY EMPLOYED. THESE PROCEDURES HAVE INHERENT PROBLEMS PARTI-CULARLY ONBOARD SHIPS WHERE LABORATORY SPACE IS LIMITED AND THE ACCURATE DETERMINATION OF MASS AND/OR VOLUME MAY BE DIFFICULT TO MAKE DUE TO THE SHIP'S MOTION. THE SHELF LIFE OF CHEMICALS AND THE HIGH DEGREE OF OPERATOR INVOLVEMENT (HUMAN FACTOR) ARE ADDITIONAL SOURCES OF ERROR. USING STATE-OF-THE-ART SENSORS/INSTRUMENTATION, FOSTER-MILLER PLANS ON DEVELOPING A SHIPBOARD AUTOMATED WATER QUALITY MONITOR (SAWQM) THAT WILL MEASURE WATER PARAMETERS THAT ARE CRITICAL TO THE SUCCESSFUL OPERATION OF A NAVY VESSEL. THE SAWQM WILL BE DESIGNED FOR THE CONFINED SPACE CONSTRAINTS OF A SHIP. IMPROVED ACCURACY,

SUBMITTED BY

REPEATABILITY, RELIABILITY, MAINTAINABILITY, EASE OF OPERATION, MINIMUM USE OF REAGENTS AND MINIMUM OPERATOR INVOLVEMENT WILL BE THE FUNCTIONAL GOALS DRIVING THE SAWQM DESIGN.

FOSTER-MILLER INC
350 SECOND AVE
WALTHAM, MA 02254
CONTRACT NUMBER:
ROBERT KOVAR
TITLE:
REINFORCED FLUOROPOLYMERS FOR TORPEDO WINDOWS
TOPIC# 112 OFFICE: NAVSEA IDENT#: 24896

FLUOROPOLYMERS WOULD MAKE SUPERIOR TORPEDO NOSE WINDOWS BECAUSE THEY HAVE GOOD SONAR RANGE ACOUSTIC VELOCITIES, SELF-NOISE CHARACTERISTICS AND ARE ENVIRONMENTALLY STABLE. THEY DO NOT ABSORB WATER AND THEY DO NOT BLEED. THEY ARE NOT USED NOW, HOWEVER, BECAUSE THEY CREEP MECHANICALLY AND THEY ARE DIFFICULT TO PROCESS AS COMPOSITES. CERTAIN NEW FLUOROPOLYMER ALLOYS HAVE GREAT PROMISE FOR IMPROVING THE PROCESSING. THE OBJECTIVE OF THIS PROGRAM IS TO SPECIALLY FORMULATE MIXTURES OF COMMERCIALLY AVAILABLE FLUOROPOLYMER AQUEOUS DISPERSIONS AND THEN COAT REINFORCEMENT FABRICS TO THE APPROPRIATE THICKNESS VIA MULTIPLE COATING AND FUSION STEPS. THE ALLOYS WILL FORM DURING THE FUSION PROCESS BY DISSOLUTION AND CONSOLIDATION OF MELTED DISPERSION PARTICLES. MULTIPLE PLIES WILL BE CONSOLIDATED AT ELEVATED TEMPERATURES AND PRESSURES, TO FORM DENSE, VOID-FREE STRUCTURES THAT EXHIBIT UNIQUE ACOUSTIC WAVE PROGATION PROPERTIES. THE ACOUSTIC AND MECHANICAL PROPERTIES OF THESE COMPOSITE STRUCTURES WILL BE DETERMINED. PHASE I WILL DETERMINE THE FEASIBILITY OF COATING FABRIC REINFORCEMENTS WITH FLUOROPOLYMER ALLOYS, FUSING AND CONSOLIDATING THE FLUOROPOLYMERS, AND FABRICATING THEM INTO COMPLEX STRUCTURES BY APPLICATION OF HEAT AND PRESSURE. PHASE II OF THIS STUDY WILL INCLUDE SCALEUP OF OPTIMIZED BLENDS OF FLUOROPOLYMER COATED FABRIC REINFORCEMENTS IN QUANTITIES SUFFICIENT TO MAKE PROTOTYPE TORPEDO NOSE WINDOWS.

FUZETRON INC
1100-J N MAGNOLIA AVE
EL CAJON, CA 92020
CONTRACT NUMBER:
DR THOMAS W OAKES
TITLE:
INNOVATIVE MICROWAVE ABSORBING PAINT SYSTEMS OF LIQUID 100% SOLID AND POLYMER POWDER COATINGS FOR MANUAL AND SPRAY APPLICATIONS
TOPIC# 245 OFFICE: DTNSRDC IDENT#: 22405

SUBMITTED BY

THERE IS A PROBLEM OF INTERFERING REFLECTIONS OR GHOSTING IN CERTAIN MICROWAVE BANDS FOR SOME NAVY APPLICATIONS. THE OBJECTIVES OF THE PRESENT EXPLORATORY DEVELOPMENT RESEARCH ARE TO DESIGN AND FORMULATE A MANUAL APPLICATION AND A SPRAY-ON MICROWAVE ABSORBING PAINT, TEST PANELS WILL BE PAINTED AND TESTS WILL BE MADE FOR ABSORBING CHARACTERISTICS. THE FORMULATION WILL INCLUDE LIQUID, 100% SOLIDS AND DRY POWDER COATINGS THAT ARE WEATHERABLE AND DURABLE IN OCEAN CONDITIONS. FOCUS WILL BE ON DEVELOPMENT OF LIGHTWEIGHT COATINGS. THE PROPOSERS HAVE HAD EXPERIENCE WITH EACH OF THE BINDER SYSTEMS, APPLICATION PROCEDURES AS WELL AS BEING ACQUAINTED WITH A WIDE RANGE OF ACTIVE ADDITIVES FOR RADAR ABSORBING SYSTEMS. THE INNOVATION IN THIS WORK IS IN THE COMBINATION OF PAINT SYSTEM PROPOSED, DESIGN AND FORMULATION SYSTEMS TO MAINTAIN HOMOGENEITY OF PREPARED MATERIALS COUPLED WITH APPLICATION TECHNOLOGY TO PRODUCE ABSORBING PAINT SYSTEMS. THE PROPOSERS HAVE ON HAND EQUIPMENT TO ASSESS ABSORPTION AND RADAR CROSS SECTION REDUCTION.

FUZETRON INC
1100-J N MAGNOLIA AVE
EL CAJON, CA 92020
CONTRACT NUMBER: N68335-89-C-0021
DR THOMAS W OAKES
TITLE:
NOVEL CHEMICAL WARFARE PROTECTIVE COATINGS FOR AVIATION GROUND SUPPORT SYSTEMS
TOPIC# 224 OFFICE: NAEC IDENT#: 24052

A MAJOR PROBLEM IN CURRENT WARFARE IS THE EXPOSURE OF AIR OPERATIONS OF SHIPS AND SHORE BASED SITES TO CHEMICAL WARFARE TOXIC AGENTS THAT ARE A SERIOUS HAZARD TO SERVICE CREW PERSONNEL. A METHOD FOR REDUCING THIS HAZARD TO PERSONNEL IS TO HAVE SUCH AVIATION SUPPORT EQUIPMENTS AND SYSTEMS COATED WITH MATERIALS THAT DO NOT COLLECT AND ABSORB NOXIOUS CHEMICALS AND THAT EASILY RELEASE OR DESORB QUICKLY. THE OBJECTIVE OF THE PRESENT BASIC RESEARCH IS TO SELECT AND TEST CERTAIN COATING MATERIALS KNOWN TO OFFER LOW SURFACE ADHESION, HAVE LOW PENETRATION BY FOREIGN CHEMICALS AS WELL AS OFFER RELEASE CHARACTERISTICS. A RANGE OF MATERIALS WILL BE USED INCLUDING TWO COMPONENT, AMBIENT CURE, 100% SOLIDS, AS WELL AS THERMAL CURED POWDER

SUBMITTED BY

COATINGS. INCLUDED WILL BE SPRAY-ON VISUAL OBSCURANCE, RADAR BSORBING AND LASER ATTENUATING COATINGS TO CREATE A MULTISPECTRAL APPROACH. THE SYSTEMS APPROACH IS USED AS A METHOD TO ADDRESS THE OVERALL PROBLEM. TESTING WILL BE CARRIED OUT FOR EVALUATING ACCORDING TO INDUSTRY AND MIL SPEC STANDARDS. THE PROPOSERS HAVE HAD EXPERIENCE IN DEVELOPMENT OF COATING THEORY, NOVEL COATINGS AND INNOVATIVE COATING APPLICATIONS TECHNIQUES THAT EXHIBIT OCEAN FOULING RELEASE, RADAR CROSS SECTION ATTENUATION AS WELL AS APPLICATION OF COATING SYSTEMS WITH DURABILITY IN SEVERE ENVIRONMENTAL CONDITIONS.

GDS TECHNOLOGY INC
PO BOX 473 - 25235 LEER DR
ELKHART, IN 46515
CONTRACT NUMBER:
DR AURORA F deCASTRO
TITLE:
RAPID TEST TO MONITOR BLOOD MANNOSE LEVELS
TOPIC# 57 OFFICE: NMRDC IDENT#: 22445

D-MANNOSE CONCENTRATIONS IN BLOOD APPARENTLY INCREASE IN PATHOLOGICAL SITUATIONS SUCH AS SEPTIC SHOCK OR INFECTIONS BY FUNGUS OR GRAM NEGATIVE ORGANISMS. THEREFORE, AN ACCURATE AND SIMPLE METHOD FOR THE MEASUREMENT OF MANNOSE IS VITAL FOR DETERMINATION OF THE STATUS OF THE DISEASE. D- MANNOSE IS GENERALLY MEASURED BY GAS LIQUID CHROMATOGRAPHY OR BY A SEVERAL STEP ENZYMATIC APPROACH WHICH IS INCONVENIENT AND TIME CONSUMING. ALTERNATIVELY, A RAPID TEST TO MONITOR BLOOD MANNOSE USING AN ENZYME WHICH WILL DIRECTLY OXIDIZE D-MANNOSE SPECIFICALLY IS PROPOSED HERE. AS SUCH AN ENZYME IS NOT COMMERCIALLY AVAILABLE OR KNOWN, THE RESEARCH PROPOSAL FOCUSES ON SCREENING AND FINDING A SUITABLE ORGANISM WHICH IS CAPABLE OF PRODUCING D-MANNOSE OXIDASE/DEHYDROGENASE (PHASE I). THE GOAL OF PHASE II WILL BE TO ISOLATE AND PURIFY THE MANNOSE OXIDIZING ENZYME AND USING THIS ENZYME TO DEVELOP A LIQUID TEST OR A DRY CHEMISTRY TEST STRIP FOR D-MANNOSE (SIMILAR TO AMES' OR BOEHRINGER'S WHOLE BLOOD GLUCOSE STRIP TEST). THE TEST WILL BE SIMPLE TO PERFORM AND WILL YIELD FAST AND ACCURATE RESULTS.

GINER INC
14 SPRING ST
WALTHAM, MA 02254
CONTRACT NUMBER:
DR JOHN A KOSEK
TITLE:
DEVELOPMENT OF AN AIR QUALITY SENSOR FOR SUBMARINE ATMOSPHERES
TOPIC# 90 OFFICE: NAVSEA IDENT#: 24590

SUBMITTED BY

THE DEVELOPMENT OF A COMPACT, LOW-COST INSTRUMENT FOR MONITORING THE CONCENTRATIONS OF CO, NO, AND NO(2) IN SUBMARINE ATMOSPHERES IS PROPOSED. THE INSTRUMENT WILL BE BASED ON SOLID POLYMER ELECTROLYTE SENSOR CELLS AND A NOVEL POTENTIODYNAMIC METHOD FOR DETECTING LOW CONCENTRATIONS OF GASES. THE PROPOSED DETECTION RANGES ARE: 0-400 ppm CO, 0-50 ppm NO, AND 0-20 ppm NO(2). SOLID POLYMER ELECTROLYTE CELLS REQUIRE ONLY WATER FOR OPERATION. THERE ARE NO HARSH CHEMICALS OR ELECTROLYTES THAT COULD ENDANGER PERSONNEL OR LEAD TO CORROSION CONCERNS FOR THE CELL AND SUBMARINE MATERIALS. DUE TO THE COMBINED ADVANTAGES OF A SOLID POLYMER ELECTROLYTE AND THE POTENTIODYNAMIC METHOD, THE INSTRUMENT WILL OFFER SIMPLICITY OF OPERATION, LONG LIFE, LOW MAINTENANCE, INFREQUENT CALIBRATION, AND HIGH SELECTIVITY, IN ADDITION TO SIGNIFICANT REDUCTIONS IN COST AND SIZE OVER THE CURRENTLY USED MONITOR.

GLOBAL ASSOCS LTD
1423 POWHATAN ST - #4 STA SQ
ALEXANDRIA, VA 22314
CONTRACT NUMBER:
DR PAUL W SPARKS
TITLE:
FIBER OPTIC TELEMETRY SYSTEMS
TOPIC# 111 OFFICE: NAVSEA IDENT#: 24890

LARGE AREA ARRAYS WILL EMPLOY A VAST NUMBER OF ELEMENTS AND THIS REQUIRES THAT TELEMETRY SYSTEMS BE UPGRADED TO HANDLE THE INCREASE IN DATA TRANSMISSION AND PROCESSING REQUIREMENTS. THE NUMBER OF HULL PENETRATIONS TO REALIZE THE SUITABLE TELEMETRY REQUIREMENTS FOR INBOARD PROCESSING ALSO MUST BE KEPT TO A MINIMUM. THE PROPOSED SOLUTION IS TO EVALUATE THE USE OF A FIBER OPTIC TELEMETRY SYSTEM. THE PHASE I EFFORT WILL CONSIST OF TWO DIFFERENT SOLUTIONS, A TELEMETRY SYSTEM FOR CONVENTIONAL HYDROPHONES AND ONE FOR FIBER OPTIC HYDROPHONES. IN BOTH SOLUTIONS, PARAMETRIC AND TRADE-OFF STUDIES WILL BE PERFORMED TO EVALUATE WHICH SYSTEM WILL BE OPTIMAL FOR THE INDIVIDUAL APPLICATION. AFTER SUCCESSFUL COMPLETION OF PHASE I STUDIES, THE INFORMATION WILL BE TRANSITIONED TO A PHASE II EFFORT. THE PHASE II EFFORT WILL CONSIST OF BUILDING AND TESTING PROTOTYPE TELEMETRY SYSTEMS.

SUBMITTED BY

HEFFLEY R ENGINEERING
349 FIRST ST
LOS ALTOS, CA 94022
CONTRACT NUMBER:
ROBERT K HEFFLEY
TITLE:
OUTER-LOOP CONTROL FACTORS FOR CARRIER AIRCRAFT
TOPIC# 66 OFFICE: NAVAIR IDENT#: 24468

THE CARRIER LANDING CONTINUES TO BE A DOMINANT DESIGN PROBLEM FOR NAVY AIRCRAFT. EVEN THOUGH THE OUTER-LOOP CONTROL TASKS OF GLIDE-SLOPE, AIRSPEED, AND LINEUP ARE CRUCIAL, THEY ARE ONLY PARTIALLY ADDRESSED IN CURRENT DESIGN REQUIREMENTS. THE PROPOSED EFFORT WILL ATTACK THE OUTER-LOOP FACTORS DIRECTLY AND RATIONALLY USING PROVEN ANALYSIS TECHNIQUES AND AVAILABLE DATA IN ORDER TO PROVIDE A FOUNDATION FOR IMPROVING DESIGN REQUIREMENTS. THE SPECIFIC TECHNICAL APPROACH PLANNED IS TO CONFIGURE A MATH MODEL OF THE PILOT-VEHICLE COMBINATION WITHIN THE CONTEXT OF THE CARRIER LANDING TASK AND EXPLORE THE MODEL USING RECENTLY ACQUIRED PILOTED-SIMULATION DATA FOR CARRIER LANDING UNDER CAREFULLY CONTROLLED CONDITIONS. THIS WILL RESULT IN A USEFUL CAUSE-EFFECT AUDIT TRAIL LINKING PHYSICAL DESIGN FEATURES TO FLYING QUALITIES AND STABILITY AND CONTROL CHARACTERISTICS. THE ANALYSIS RESULTS WILL BE COMPARED AGAINST EXISTING REQUIREMENTS IN ORDER TO DETERMINE WHERE GAPS EXIST.

HITTMAN MATERIALS & MEDICAL COMPONENTS
9190 RED BRANCH RD
COLUMBIA, MD 21045
CONTRACT NUMBER:
HAROLD N BARR
TITLE:
FABRICATION OF A HIGH STRENGTH POROUS ALUMINUM MATERIAL
TOPIC# 154 OFFICE: NSWC IDENT#: 23706

THIS PROPOSAL IS TO DEVELOP THE MATERIAL AND PROCESS FOR THE FABRICATION OF A HIGH STRENGTH, POROUS ALUMINUM ALLOY MATERIAL. THE

SUBMITTED BY

APPROACH TAKEN HERE IS BASED ON POWDER METALLURGICAL PROCESSING AND COVERS COLD ISOSTATIC PRESSING FOLLOWED BY SINTERING OF ALUMINUM POWDER METAL ALLOYS AND POWDER BLENDS. THE DEVELOPMENT OF THE HIGH STRENGTH POROUS MATERIALS IS BASED ON POWDER METAL PROCESSING OF HEAT TREATABLE, PRECIPITATION HARDENING ALLOYS AND DISPERSION STRENGTHENING AND HARDENING OF ALLOYS WITH ALUMINIDE COMPOUNDS.

HOLOMETRIX INC (ACCI ELECTRO-OPTICS DIV)
99 ERIE ST
CAMBRIDGE, MA 02139
CONTRACT NUMBER:
DR P GREGORY DeBARYSHE
TITLE:
REAL-TIME SHIPBOARD SEAWAY SENSOR
TOPIC# 82 OFFICE: NAVSEA IDENT#: 24523

A SEAWAY SENSOR IS NEEDED FOR 1) BETTER MATCHING SHIP DESIGN TO PERFORMANCE IN SEAKEEPING TRIALS, 2) GENERATING OPERATIONAL CONSTRAINTS, AND 3) TACTICAL APPLICATIONS WHERE FREQUENT RELIABLE ASSESSMENT OF SEA STATE HELPS CONDUCT OPERATIONS SAFETY, EFFICIENTLY AND PRODUCTIVELY. A USEFUL SEAWAY SENSOR MUST IN REAL-TIME MEASURE WAVE HEIGHT, DIRECTION AND PERIOD, THEN PRESENT OPTIMALLY USEFUL INFORMATION FROM THESE DATA TO OPERATIONAL PERSONNEL AND TO TACTICAL DECISION AIDS. IN SOME CASES, LIKE RIDE CONTROL, PHASE (TIMING) DATA IS ALSO NEEDED. CHIEF CRITERIA FOR JUDGING CANDIDATE APPROACHES WILL BE (1) CAPABILITY TO PROVIDE THE REQUIRED DATA IN ALL SEA CONDITIONS, AND (2) RELIABILITY UNDER EVEN THE MOST VIOLENT OPERATING CONDITIONS. ALTHOUGH OTHER TECHNOLOGIES WILL BE CONSIDERED, OUR BASELINE DESIGN IS A HYBRID SYSTEM CONSISTING OF A RUGGED BOW MOUNTED LASER HEIGHT/ PERIOD PROFILER WITH MICROWAVE RADAR DIRECTION EXTRACTION. PHASE I EFFORT WILL STRESS THOSE ELEMENTS MOST VULNERABLE TO THE OPERATING ENVIRONMENT: 1) DESIGN AND DEMONSTRATION OF A SURVIVABLE BOW MOUNTED LASER HEIGHT GAUGE SUBSYSTEM, 2) OPERATIONAL PROTOTYPE SYSTEM ASSESSMENT, 3) REQUIREMENTS AND CONCEPTUAL DESIGN FOR PHASE II IMPLEMENTATION.

HORRIGAN ANALYTICS
1460 N SANDBURG TER
CHICAGO, IL 60610
CONTRACT NUMBER:
TIMOTHY J HORRIGAN
TITLE:
CONFIGURAL THEORY FOR QUANTIFYING THE EFFECTIVENESS OF SHIP SELF-DEFENSE WEAPONS IN TACTICAL ENGAGEMENT
TOPIC# 14 OFFICE: ONT IDENT#: 24172

SUBMITTED BY

MULTIPLE-TARGET, MULTIPLE-WEAPON ENCOUNTERS, NOT ISOLATED ENCOUNTERS BETWEEN SINGLE TARGETS AND SINGLE WEAPONS, TYPIFY COMBAT. CONFIGURAL THEORY IS A MATHEMATICAL CONCEPTUALIZATION OF COMBAT -- SPECIFICALLY, A CONCEPTUALIZATION OF THE RELATIONSHIP BETWEEN THE BEHAVIOR OF WEAPONS IN USE AND THEIR INDIVIDUAL CHARACTERISTICS -- THAT ENCOMPASSES A FUNDAMENTAL ELEMENT OF MULTIPLE-TARGET, MULTIPLE-WEAPON ENCOUNTERS EXCLUDED BY THE CUSTOMARY CONCEPTUALIZATIONS AND THE DERIVATIVE MATHEMATICAL MODELS, PARTICULARLY THOSE USED IN RESEARCH AND DEVELOPMENT. THE ELEMENT IS CONFIGURATION: THE DISTRIBUTION IN SPACE OF THE TARGETS AND THE WEAPONS INVOLVED IN AN ENGAGEMENT. FOR PROPOSED AND DEVELOPMENTAL WEAPONS THE CUSTOMARY CONCEPTS, BECAUSE THEY EXCLUDE CONFIGURATION, CAN OVER-STATE COMBAT EFFECTIVENESS BY FACTORS OF TWO TO TEN OR EVEN MORE AND CAN MAKE INFERIOR WEAPONS APPEAR TO BE BETTER THAN WEAPONS THAT ARE ACTUALLY SUPERIOR. DEVELOPING THE ELEMENTS OF A CONFIGURAL THEORY OF THE EFFECTIVENESS OF SHIP SELF-DEFENSE WEAPONS IN TACTICAL ENGAGEMENTS IS THE OVERALL OBJECTIVE OF THE PROPOSED RESEARCH. THE KEY PORTION IS FORMULATING THE MATHEMATICAL BASIS FOR QUANTITIATIVELY DESCRIBING HOW SHIP SELF-DEFENSE WEAPONS BEHAVE IN COMBAT AND HOW THAT BEHAVIOR RELATES TO THE INDIVIDUAL CHARACTERISTICS OF THE SHIPS, THEIR CONFIGURATION, THEIR SELF-DEFENSE WEAPONS, THE CONFIGURATION OF THOSE WEAPONS ON THE INDIVIDUAL SHIPS, THE CONFIGURATION OF THE ATTACKER'S PLATFORMS, AND THE ATTACKER'S ANTISHIP WEAPONS.

HURD H L ASSOCS INC
309 MOSS RUN
RALEIGH, NC 27614
CONTRACT NUMBER:
HARRY L HURD
TITLE:
RESEARCH ON FEATURE EXTRACTION AND CLASSIFICATION FOR NONSTATIONA AND TRANSIENT SIGNALS
TOPIC# 2 OFFICE: ONR IDENT#: 22320

THIS WORK ADDRESSES THE RECOGNITION OF TRANSIENT AND NONSTATIONARY SIGNALS BY A COLLECTION OF FEATURE EXTRACTION ALGORITHMS FOLLOWED BY LOGIC THAT COMBINES THE FEATURE ESTIMATES TO PRODUCE SIGNAL CLASSIFICATION. THE FEATURE EXTRACTION ALGORITHMS INCLUDE ESTIMATORS

SUBMITTED BY

FOR SPECTRAL COHERENCE, A TECHNIQUE THAT ILLUMINATES THE PRESENCE OF RHYTHMIC MODULATIONS IN SIGNALS. NEURAL NETS WILL BE EXAMINED AS A METHOD FOR ENCODING SIGNAL PROCESSING FEATURES AND FOR PERFORMING THE CLASSIFICATION FUNCTION.

HYDROACOUSTICS INC
PO BOX 23447
ROCHESTER, NY 14692
CONTRACT NUMBER:
DAVID E NELSON
TITLE:
CONTINUOUS TRANSMISSION SONAR
TOPIC# 115 OFFICE: NAVSEA IDENT#: 24908

A STUDY IS PROPOSED WHICH WILL IDENTIFY THE SPECIAL PROBLEMS ASSOCIATED WITH CONSTRUCTING A LONG RANGE, LOW FREQUENCY CONTINUOUS TRANSMISSION SONAR. THE BENEFITS OF THIS CONTINUOUS OPERATION ARE REDUCED SOURCE LEVEL FOR A GIVEN DETECTION RANGE, AND NEARLY CONTINUOUS TRACKING INFORMATION ON THE TARGET. THREE PRINCIPAL PROBLEM AREAS ARE IDENTIFIED: OBTAINING SUFFICIENT TIME-FREQUENCY SPACE IN THE OCEAN MEDIUM TO BE ABLE TO UTILIZE TRANSMISSION WITH ADEQUATE TIME-BANDWIDTH PRODUCT, THE DYNAMIC RANGE PROBLEM ASSOCIATED WITH THE RECEIVER INPUT AND LATER PROCESSING, AND THE LARGE QUANTITY OF DATA TO BE BEAMFORMED, CORRELATED, AND DETECTED. BECAUSE OF PREVIOUS WORK, HYDROACOUSTICS HAS EXAMINED A CLASS OF SIGNALS BASED UPON FM OR FSK WHICH ARE SEMI-ORTHOGONAL AND ADDRESS THE FIRST PROBLEM, AND HYDROACOUSTICS HAS STUDIED DIGITAL DYNAMIC RANGE REQUIREMENTS IN SONAR PROCESSING WHICH YIELD OPTIMISTIC RESULTS IN ADDRESSING THE SECOND PROBLEM. THE FINAL PROBLEM IS ONE OF DEFINING THE HARDWARE/SOFTWARE NECESSARY, AND INITIAL ESTIMATES ALSO A FAVORABLE TOWARD THE FEASIBILITY OF THE SYSTEM.

HYDROACOUSTICS INC
PO BOX 23447
ROCHESTER, NY 14692
CONTRACT NUMBER:
DAVID E NELSON
TITLE:
OWN TRANSMISSION CANCELLATION FOR CONTINUOUS FREQUENCY MODULATION SONARS
TOPIC# 123 OFFICE: NAVSEA IDENT#: 24951

SUBMITTED BY

A PROBLEM IS RECOGNIZED IN THE PROPOSED USE OF CONTINUOUS TRANSMISSION FM ACTIVE SONAR IN THE INTERFERENCE FROM THE TRANSMITTED SIGNAL MAY EXCEED THE RECEIVED ECHO LEVEL BY AS MUCH AS 190 dB. THE USE OF A CIRCUIT IMMEDIATELY FOLLOWING EACH RECEIVING HYDROPHONE IS PROPOSED TO EASE THE PROBLEM BY CANCELLING OR OTHERWISE REDUCING THE SIGNAL DUE TO THE TRANSMISSION. IT IS RECOGNIZED THAT THE INTERFERING SIGNAL WILL CONTAIN SOME RANDOMNESS DUE TO THE MOTION OF SHIP AND ARRAY THROUGH THE WATER, AND THIS RANDOMNESS WILL LIMIT THE EFFECTIVENESS OF THE CIRCUIT. A MODEL STUDY IS PROPOSED TO PREDICT THE DEGREE OF RANDOMNESS, AND HENCE THE LOWER FLOOR OF THE CANCELLATION CIRCUIT WHICH MAY BE ACHIEVED. A GENERIC CIRCUIT IS DERIVED WHICH SATISFIES THE NEED TO ADAPTIVELY FILTER OUT THE OWN TRANSMISSION INTERFERENCE. THIS CIRCUIT WILL BE FINALIZED AND BREADBOARD, AND THE PERFORMANCE OF THE BREADBOARD MEASURED FOR COMPLIANCE WITH THE DESIGN GOALS. A REPORT WILL BE ISSUED DOCUMENTING THE RESULTS OF THE ACOUSTIC STUDY, THE CIRCUIT DESIGN, THE CIRCUIT PERFORMANCE, AND, MOST IMPORTANT, A VALUE FOR TRANSMISSION SUPPRESSION WHICH CAN BE EXPECTED IN A REAL SONAR SITUATION.

HYDROGEN CONSULTANTS INC
12420 N DUMONT WY
LITTLETON, CO 80125
CONTRACT NUMBER:
FRANKLIN E LYNCH
TITLE:
CLOSED-CYCLE SUBMERSIBLE POWER SYSTEMS
TOPIC# 94 OFFICE: NAVSEA IDENT#: 24737

HIGH PERFORMANCE COMBUSTION POWER SYSTEMS FOR SMALL UNTETHERED SUBMERSIBLE VEHICLES WILL BE SOUGHT BY COMPARING PROVEN METHODS WITH MODERN ALTERNATIVES, INCLUDING ADVANCED CRYOGENICS AND SOLID-STATE STORAGE OF HYDROGEN AND OXYGEN. A LARGE LIST OF POTENTIALLY ATTRACTIVE COMBINATIONS OF REACTANTS, CONVERTERS, AND EXHAUST COLLECTION PROCESSES WILL BE EXAMINED FROM TWO VIEWPOINTS. FIRST, THE CHEMICAL ISSUES WILL BE CONSIDERED, CALCULATING GRAVIMETRIC AND VOLUMETRIC ENERGY DENSITIES FOR THE AGGREGATE OF FUEL, OXIDIZER AND ANY CHEMICAL SPECIES REQUIRED TO PROCESS THE EXHAUST STREAM. CON-

SUBMITTED BY

TAINERS FOR REACTANTS AND PRODUCTS WILL BE INCLUDED IN THE WEIGHT AND VOLUME ESTIMATES SO THAT THE EFFECTS OF CRYOGENIC DEWARS, PRESSURE VESSELS, HYDRIDES, OXIDES, ETC., ARE ACCOUNTED FOR. THE SECOND ISSUE IN THE SELECTION PROCESS WILL BE MECHANICAL EQUIPMENT EVALUATION INCLUDING A VARIETY OF ENGINES, AND EXHAUST PROCESSING EQUIPMENT. EACH SYSTEM WILL BE CHARACTERIZED BY ITS NET EFFICIENCY, WEIGHT AND ENVELOPE VOLUME. THE BEST CHEMICAL OPTIONS WILL BE PAIRED UP WITH APPROPRIATE MECHANICAL EQUIPMENT AND AT LEAST THREE SYSTEMS WILL BE COMPARED IN DETAIL TO FORM THE FINAL CONCLUSIONS OF THE STUDY. THE BEST ALTERNATIVE WILL BE BUILT AND TESTED IN PHASE II AND DEMONSTRATED AT FULL-SCALE IN THE REYNOLDS ALUMINAUT IN PHASE III.

INDUSTRIAL QUALITY INC
PO BOX 2397 - 9832 CANAL RD
GAITHERSBURG, MD 20879
CONTRACT NUMBER:
THOMAS S JONES
TITLE:
LASER OPTICAL DETECTION OF ELASTIC WAVES PROPAGATION IN METALLIC PLATES
TOPIC# 170 OFFICE: NSWC IDENT#: 23838

AN IMPROVED LASER GENERATION AND DETECTION SYSTEM UTILIZING FIBER OPTIC COUPLING TO THE INSPECTION SURFACE IS PROPOSED. THE SYSTEM USES ADVANCED INTERFEROMETER CONCEPTS AND TAKES ADVANTAGE OF THE REMOTE TRANSMISSION CAPABILITIES OF THE FIBER OPTICS TO PROVIDE IMPROVED SIGNAL-TO-NOISE CAPABILITIES IN THE MANUFACTURING ENVIRONMENT. THE SYSTEM WILL OFFER EXCEPTIONAL CONTROL OF SOUND INPUT AND DETECTION AREA AND LOCATION SUCH THAT MATERIALS CHARACTERIZATION AS WELL AS FLAW DETECTION WILL BE POSSIBLE. THE SYSTEM WILL BE DEVELOPED FOR THE INSPECTION OF METALLIC MATRIX MATERIALS, BUT SHOULD BE APPLICABLE TO MANY INSPECTION APPLICATIONS REQUIRING NONCONTACT GENERATION AND SENSING. A MAJOR OBJECTIVE OF THE PHASE I EFFORT WILL BE THE CHARACTERIZATION OF THE EFFECTS OF SURFACE ROUGHNESS AND EXTERNAL NOISE AND VIBRATION ON THE SIGNAL-TO-NOISE CHARACTERISTICS AND SENSITIVITY OF THE LASER BASED SYSTEMS. SYSTEM VARIABLES TO BE EVALUATED WILL INCLUDE INTERFEROMETER TYPE, LASER SOURCE TYPE AND POWER. THIS FEASIBILITY STUDY WILL LEAD TO THE DEVELOPMENT OF A USEFUL SYSTEM TO INSPECT ADVANCED MATERIALS IN-SITU. COMMERCIAL

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PROSPECTS CLEARLY EXIST FOR AN EFFECTIVE NONCONTACT INSPECTION SYSTEM SUITABLE FOR THE PRODUCTION ENVIRONMENT.

INSTITUTE OF MODERN PROCEDURES INC
8850 RICHMOND HWY
ALEXANDRIA, VA 22309
CONTRACT NUMBER:
TIMOTHY H HINDS
TITLE:
TAILORING THE MICROCOMPUTER CONFIGURATION STATUS ACCOUNTING SYSTE FOR USE BY ISEAS AND ILO TEAMS
TOPIC# 126 OFFICE: NAVSEA IDENT#: 24991

UNTIL RECENTLY, THE COMPLEXITY, SCOPE, AND SHEER VOLUME OF SHIP CONFIGURATION DATA MANDATED THE USE OF EXPENSIVE MAINFRAMES OR MINICOMPUTERS TO PERFORM AUTOMATED CONFIGURATION STATUS ACCOUNTING TASKS. IMP IS NOW DEVELOPING THE MICROCOMPUTER CONFIGURATION STATUS ACCOUNTING SYSTEM (MICRO-CSA) AS A LOW-COST ALTERNATIVE TO MINI-COMPUTER PROCESSING AT THE NAVSEACENs. MICRO-CSA USES CD-ROM AND WORM OPTICAL DISKS TO STORE LARGE REFERENCE FILES FORMELY AVAILABLE ONLY ON MICROFICHE OR ON VERY LARGE MAGNETIC DISK DRIVES. THE NAVY'S SHIP CONFIGURATION AND LOGISTICS SUPPORT INFORMATION SYSTEM (SCLSIS) HAS EXPERIENCED NUMEROUS PROBLEMS DUE TO THE DISPARATE ADP RESOURCES AVAILABLE TO THE ACTIVITIES THAT SUPPORT IT. BECAUSE OF MICRO-CSA'S RELATIVELY LOW COST, IT IS NOW FEASIBLE TO EQUIP EVERY SCLSIS ACTIVITY WITH A MICRO-CSA SYSTEM, THUS STANDARDIZING ADP SUPPORT THROUGHOUT THE SCLSIS COMMUNITY. THE COMMITMENT OF RESOURCES AND PROGRAMMING DESIGN WOULD BE MINIMAL SINCE THIS CONCEPT IS BASED ON AN EXISTING SYSTEM.

INSULATING MATERIALS INC
1 CAMPBELL RD
ROTTERDAM, NY 12306
CONTRACT NUMBER:
MARK MARKOVITZ
TITLE:
NOVEL EPOXY RESINS AND PROCESS FOR POLYMER IMPREGNATED TIMBER
TOPIC# 233 OFFICE: NCEL IDENT#: 24120

SUBMITTED BY

THIS PROJECT WILL DEVELOP OPTIMUM EPOXY RESIN-WOOD COMBINATIONS FOR PRESSURE IMPREGNATED TIMBER (PIT) STRUCTURES, EVALUATE VACUUM PRESSURE IMPREGNATION (VPI) METHODS, DEVELOP SUITABLE PHYSICAL TESTS, AND INITIAL DESIGN DATA CRITERIA. THE RESINS WILL BE CHEMICAL MODIFICATIONS OF EPOXY RESIN COMPOSITIONS DEVELOPED BY THE PRINCIPAL INVESTIGATOR FOR VPI OF LARGE ROTATING ELECTRICAL EQUIPMENT. SUCH RESINS PROVIDE LONG STORAGE LIFE WITHOUT REFRIGERATION, ALLOW REASONABLE IMPREGNATION AND CURE TIMES AND YIELD PROPERTIES WITH IMPROVED STRENGTH AND ABRASION RESISTANCE, FOR USE IN PIERS AND OTHER MARINE STRUCTURES, AS COMPARED TO POLYESTER RESINS. THE ADVANCED DEVELOPMENT NEEDED TO ADAPT THESE MATERIALS FOR MAKING PIT INCLUDES OPTIMIZATION OF REACTIVE DILUENT MODIFIED, ORGANOMETALLIC-CATALYZED, BISPHENOL A AND CYCLOALIPHATIC EPOXY RESINS FOR VPI OF SELECTED WOODS, USE OF LABORATORY SCALE, VPI EQUIPMENT FOR THE DEVELOPMENT OF PROCESS CYCLES TO DRY, IMPREGNATE AND CURE THE PRODUCT AND MEASUREMENT OF PHYSICAL PROPERTIES AND STRUCTURAL CHARACTERISTICS OF PIT TO PROVIDE PRELIMINARY DESIGN GUIDANCE FOR ENGINEERING APPLICATION. A COMPARISON OF *PIT AND CONVENTIONAL WOOD DESIGN* CHARACTERISTICS FOR PIER CONSTRUCTION WILL BE MADE, INCLUDING MATERIALS COSTS. CONSIDERATION WILL GIVEN TO PHASE II MANUFACTURING, LIFE COST, AND FIELD TESTING WORK NEEDED TO BRING THE DEVELOPMENT TO COMMERCIAL REALITY.

IRVINE SENSORS CORP
3001 REDHILL AVE - BLDG III/STE 208
COSTA MESA, CA 92626
CONTRACT NUMBER:
DAVID E LUDWIG
TITLE:
APPLICATION OF HYMOSS SIGNAL PROCESSING CIRCUITRY TO MINIATURE CRYOSTATICALLY-COOLED DEWARS (MCCD)
TOPIC# 209 OFFICE: NWC IDENT#: 23174

IRVINE SENSORS CORPORATION (ISC) HAS DEVELOPED SEVERAL ONE-HALF INCH INTEGRATED CIRCUITS (IC'S) FOR 128-CHANNEL IR DETECTOR ARRAY READOUTS AT CRYOGENIC TEMPERATURES INCLUDING PRE-AMPLIFIERS, FILTERS, AND A MULTIPLEXER. FROM THE MUCH SMALLER (15-30 ELEMENT) ARRAYS ASSOCIATED WITH THE MINIATURE CRYSTATICALLY-COOLED DEWAR (MCCD), THE IC SIZE CAN BE GREATLY REDUCED, SO MUCH SO, IN FACT, THAT ALL OF THE CONTROL

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LOGIC CAN BE BROUGHT ON-CHIP REDUCING THE PIN-OUT REQUIREMENTS TO FIVE OR SIX WIRES. ICS, THEREFORE, PROPOSES TO PLACE 32 CHANNELS OF ITS PROVEN HYMOSS SIGNAL PROCESSING CIRCUITS, ALONG WITH THE CONTROL LOGIC, ON AN IC SIZED TO FIT INTO A REPRESENTATIVE MINIATURE JOULE-THOMSON COOLER. SPECIFICALLY, A 150 MIL SQUARE IC CONSUMING LESS THAN A MILLIWATT OF POWER IS COMTEMPLATED. IN PHASE I, ISC PROPOSES TO DESIGN AND VERIFY ANALYTICALLY THE PERFORMANCE OF THE IC. IN PHASE II, AN IC WILL BE BUILT AND TESTED.

KILDARE CORP
95 TRUMBULL ST - STE D
NEW LONDON, CT 06320
CONTRACT NUMBER:
JAMES W FITZGERALD
TITLE:
LOW FREQUENCY ACOUSTIC TRANSPONDER
TOPIC# 217 OFFICE: NUSC IDENT#: 23056

A PRELIMINARY DESIGN OF A PROJECTOR IS PRESENTED, BASED ON THE FITZGERALD FLEXBAR, THAT HAS AN ACOUSTIC OUTPUT AT FR 1000 Hz OF SOMEWHAT BETTER THAN 100 WATTS, WITH A Qm 5 AND EFFICIENCIES OF 65 - 70%. THE PROPOSED FLEXDUCER MODULE IS 15" (...) IN DIAMETER BY 15" (...) HIGH AND CONSISTS OF 36 CERAMIC FLEXBARS, NODALLY MOUNTED IN TWO TIERS OF 18 EACH. THE PROJECTOR IS AIR-BACKED AND CARRIES ITS OWN PRESSURE TANK AND TWO-STAGE PRESSURE REGULATOR.

KMS FUSION INC
PO BOX 1567
ANN ARBOR, MI 48106
CONTRACT NUMBER:
MICHAEL BUREK
TITLE:
SCANNING TUNNELING MICROSCOPE DATA AND DISPLAY SYSTEM
TOPIC# 168 OFFICE: NSWC IDENT#: 23828

THE SCANNING TUNNELING MICROSCOPE DATA AND DISPLAY SYSTEM IS AN ELECTRONIC DATA GATHERING AND CONTROL SYSTEM THAT WILL ALLOW THE

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USER OF THE INSTRUMENT TO DISPLAY DATA IN A THREE DIMENSIONAL RE-PRESENTATION WITH APPROPRIATE TOOLS FOR DATA ANALYSIS. WE PROPOSE A SYSTEM THAT UTILIZES TWO COMPUTERS, ONE THAT IS DEDICATED TO CONTROLLING THE SENSOR SYSTEM AND THE OTHER TO HANDLE DISPLAY FUNCTIONS. IN PARTITIONING THE INSTRUMENT IN THIS WAY THE DESIGN GAINS THE FLEXIBILITY TO USE DIFFERENT COMBINATIONS OF HARDWARE AND SOFTWARE IN THE CONCEPTUAL STAGE SO THAT THE USER WILL RECEIVE A SYSTEM THAT IS CLOSELY TAILORED TO THE REQUIREMENTS OF BOTH DATA GATHERING PERFORMANCE AND DATA PRESENTATION.

LISAN CORP
237 LANCASTER AVE - STE 248
DEVON, PA 19333
CONTRACT NUMBER:
WILLIAM G CHANG
TITLE:
INCREMENTAL TRANSITION OF TACTICAL AIRBORNE SYSTEMS TO ADA
TOPIC# 71 OFFICE: NAVAIR IDENT#: 24505

LISAN PROPOSES TO INVESTIGATE THE FEASIBILITY OF USING ADA FOR UPGRADING INDIVIDUAL MODULES OF AN EXISTING TACTICAL AIRBORNE SYSTEM. LISAN WILL PAY SPECIAL ATTENTION TO THE SPECIFIC NEEDS OF THIS MISSION WHILE EVALUATING THE EFFICACY OF ADA AS AN UPGRADING TOOL. THE MAJOR TECHNICAL RISKS OF AN ADA UPGRADE PATH WILL BE DETERMINED. THE EFFECT ON TARGET MEMORY UTILIZATION EXECUTION SPEED AND SYSTEM ARCHITECTURE WILL BE INVESTIGATED.

LNR COMMUNICATIONS INC
180 MARCUS BLVD
HAUPPAUGE, NY 11788
CONTRACT NUMBER:
R DEELY
TITLE:
IMPROVED ELECTRONIC SUPPORT MEASURES SENSOR CAPABILITIES
TOPIC# 244 OFFICE: NOSC IDENT#: 24168

PRESENT SHIPBOARD AUTOMATED BROAD BAND ELECTRONIC SUPPORT MEASURES

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(ESM) SYSTEMS HAVE MULTI-TARGET, AUTOMATIC DETECTION AND DISPLAY CAPABILITIES. BECAUSE OF THE ENVIRONMENTAL SIGNAL DENSITY AND THE REDUCED TIME ELEMENTS REQUIRED BY AUTOMATED SYSTEMS FOR SELF DEFENSE. ESM RECEIVER THRESHOLD SENSITIVITY HAS BEEN REDUCED TO PREVENT SYSTEM AND OPERATOR ENVIRONMENTAL OVERLOADING. THEREFORE, A PHASE I STUDY IS PROPOSED TO GENERATE AN OPTIMUM DESIGN FOR AN ADVANCED MANUAL ESM RECEIVER TO SUPPLEMENT THIS AUTOMATIC THREAT RESPONSE SYSTEM. THE PROPOSED SPECIFIC SIGNAL DETECTION AND CLASSIFICATION RECEIVER WILL CONCENTRATE ON LONG RANGE SIGNALS WHICH CANNOT BE HANDLED IN THE AUTOMATED SYSTEM DUE TO NECESSARY COMPROMISE BECAUSE OF SIGNAL DENSITY AND NEEDED SPEED TO RESPONSE. THE ADVANCED SUPPLEMENTARY SSDC RECEIVER WILL CONCENTRATE ON SIGNALS WILL UNUSUAL SIGNAL CHARACTERISTICS AND MODULATIONS, ESPECIALLY SPREAD SPECTRUM AND OTHER LOW PROBABILITY OF INTERCEPT (LPI) SIGNALS. IT WILL BE DESIGNED TO SHARE AS MANY PARTS OF THE AUTOMATED SYSTEM AS POSSIBLE, FOR EXAMPLE, ANTENNAS, PARAMETER MEASUREMENT AND DATA PROCESSING (ON A NON PRIORITY, AS AVAILABLE BASIS). SPECIAL DISPLAYS WILL BE INCLUDED TO TAKE ADVANTAGE OF POTENTIAL INTEGRATION AND OPERATOR RECOGNITION CAPABILITY BUT WITH ADDITIONAL DIGITAL DATA PROCESSING TO RELIEVE OPERATOR LOADING.

LRA LABS
18195A - E McDURMOTT
IRVINE, CA 92714
CONTRACT NUMBER:
DR LOUIS RAYMOND
TITLE:
ACCELERATED STRESS CORROSION CRACKING SCREENING TEST METHOD FOR HY-130 STEELS
TOPIC# 84 OFFICE: NAVSEA IDENT#: 24535

ACCELERATED SMALL SPECIMEN SCREENING TESTS FOR SCC RESISTANCE ARE NECESSARY FOR COST/TIME EFFICIENT EVALUATION OF WELD/BASE METAL FORMULATIONS IN WELD OR ALLOY DEVELOPMENT PROGRAMS AND FOR QUALITY CONTROL OF WELDED HY-130 STEELS. TEST DATA THAT IS CAPABLE OF MEASURING THE STRESS INTENSITY FOR CRACK INITIATION IN CATHODICALLY PROTECTED VESSELS IN NATURAL SEA WATER IS NECESSARY FROM DESIGN CONSIDERATIONS. IN THIS PHASE I EFFORT, AN EXISTING ACCELERATED SCC TEST METHOD USING CHARPY-SIZED SPECIMENS WITH THE STARTER CRACK

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LOCATED AT DIFFERENT MICROSTRUCTURAL REGIONS OF THE WELD AND IN THE BASE METAL WILL BE USED TO GENERATE PRELIMINARY, BASE-LINE DATA AT THE ONSET OF THE PROGRAM. CONCURRENTLY, A SCALED-UP VERSION OF THE EXISTING ACCELERATED SCC TESTING PROCEDURE WILL BE DESIGNED AND BUILT TO TEST FULL THICKNESS WELDED PLATES. IN EFFECT, THE MODIFIED DESIGN WILL CHANGE THE CURRENT CONSTANT LOAD CANTILEVER BEAM TEST TO A DISPLACEMENT CONTROLLED, SLOW STRAIN RATE TEST. QUANTITATIVE KISCC MEASUREMENTS OF VARIOUS MICROSTRUCTURAL REGIONS OF THE WELD WILL BE COMPARED TO SMALL SPECIMEN FULL-THICKNESS TEST RESULTS FOR BOTH AS-WELDED AND STRESS-RELIEVED WELDS. EXTREMES WITH REGARD TO SCC WILL BE USED TO ILLUSTRATE THE FEASIBILITY OF THE METHOD AS A QUALITY CONTROL TEST.

MACH I INC
346 E CHURCH RD
KING OF PRUSSIA, PA 19406
CONTRACT NUMBER:
ALBERT C CONDO
TITLE:
SHEAR RATE DETERMINATION FOR TWIN SCREW CONTINUOUS PBX PROCESSING
TOPIC# 153 OFFICE: NSWC IDENT#: 23700

THE PROPOSED RESEARCH ADDRESSES THE NEED FOR A SIMPLE, VISUAL METHOD TO DETERMINE THE SHEAR RATE EXPERIENCED IN A TWIN SCREW CONTINUOUS MIXER WHERE ENERGETIC PBX MATERIALS ARE MIXED. THE SCOPE OF THIS PROPOSAL IS TO DETERMINE THE FEASIBILITY OF ADDING SMALL QUANTITIES OF VARIOUS DRY FREE FLOWING MICROENCAPSULATED TAGGANT MATERIALS TO A SIMULATED NON-ENERGETIC PBX PROTOTYPE FORMULATION AND SUBJECTING THOSE MIXES TO THE SHEAR FORCES WITHIN A LABORATORY TWIN SCREW MIXER. SHEARING CONDITIONS EXPERIENCED DURING TWIN SCREW MIXING CAN THEN BE MEASURED BY DETERMINING THE EXTEND OF MICROCAPSULE RUPTURE AND RELEASING THE TAGGANT. TAGGANT METHODS TO BE STUDIED INCLUDE DETECTION OF RUPTURED CAPSULES BY VISUAL METHODS (COLORED DYES), HALOGEN VAPOR DETECTION (REFRIGERANT SNIFFERS), SPECTROPHOTOMETRY, ORDOR AND FLUORESCENCE. SMALL QUANTITIES OF NON-HAZARDOUS SIMULATED PBX MIXTURES CONTAINING MICROENCAPSULATED TAGGANTS WILL BE TESTED UNDER VARYING SHEAR RATE CONDITIONS IN A SMALL LABORATORY TWIN SCREW MIXER WITH INSTRUMENTATION. BY VARYING SYNTHESIS METHODS, SEVERAL MICROENCAPSULATED PARAMETERS SUCH AS CAPSULE PARTICLE

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SIZE/SIZE RANGE, WALL THICKNESS AND POLYMERIC ENCAPSULANT MATERIAL WILL BE STUDIED.

MARBLE ASSOCS INC
200 N GREAT RD
LINCOLN, MA 01773
CONTRACT NUMBER:
PAUL JURY
TITLE:
HETEROGENEOUS SENSOR FUSION IN A MOBILE ROBOT SIMULATOR
TOPIC# 16 OFFICE: ONT IDENT#: 24206

MARBLE ASSOCIATES, INC., PROPOSES TO UTILIZE THE MOBILE AUTONOMOUS ROBOT SIMULATOR (MARS) SYSTEM (DEVELOPED FOR THE UNITED STATES AIR FORCE UNDER CONTRACT NUMBER F33615-87-C-3405) TO DEVELOP AND EVALUATE VARIOUS ALGORITHMS AND HEURISTICS TO "FUSE" (I.E., COMPARE, CONTRAST, AND INTEGRATE) THE OFTEN CONFLICTING DATA RETURNED BY AN ASSORTMENT OF NON-CONTACT RANGING SENSORS. AT PRESENT, MARBLE IS RUNNING A PROTOTYPE VERSION OF THE SIMULATOR, AND WE ARE CURRENTLY INVOLVED IN NEGOTIATIONS WITH THE USAF WRIGHT AERONAUTICAL LABORATORIES FOR PHASE II FUNDING TO BUILD A PRODUCTION VERSION BASED ON THE DETAILED DESIGN SPECIFICATION PRODUCED IN THE FALL OF 1987. WHEN IMPLEMENTED, THE MARS SYSTEM WILL PERMIT THE AUTONOMOUS MOBILE ROBOTICS ENGINEERS TO EXPERIMENT WITH A WIDE VARIETY OF HEURISTICS AND ALGORITHMS FOR GUIDANCE AND CONTROL OF ROBOTIC PLATFORMS WITHOUT HAVING TO BUILD AND MAINTAIN AN ACTUAL ROBOT. THE NOVICE USER WILL BE ABLE TO MONITOR THE PERFORMANCE OF VARIOUS OFF-THE-SHELF, NON-CONTACT, RANGING SENSORS IN UNKNOWN, POTENTIALLY HOSTILE ENVIRONMENTS, WHILE THE EXPERT USER WILL BE ABLE TO ADD "DEVICE DRIVERS" FOR NEW SENSORS QUICKLY AND EFFICIENTLY,, WITHOUT HAVING TO BUILD A ROBOT AROUND THE SENSOR. IN ADDITION, THE USER WILL BE ABLE TO ENTER MAN-IN-THE-LOOP MODE TO COMMUNICATE DIRECTLY WITH LOWER-LEVEL MODULES OF THE SIMULATOR (IN EFFECT, CHANGING THE PLATFORM FROM A TRULY AUTONOMOUS VEHICLE INTO A "TELEOPERATED" VEHICLE). THE DESIGN SPECIFICATION FOR THE ARCHITECTURE OF THE SIMULATOR INCLUDES AN ISOLATED SOFTWARE MODULE KNOWN AS THE "SENSOR MANAGER" WHOSE SOLE PURPOSE IS TO RESOLVE DISCREPANCIES AMONG CONFLICTING SENSOR READINGS. MARBLE PROPOSES TO DEVELOP A FULL-FLEDGED VERSION OF THE SENSOR MANAGER TO BE USED AS A TOOL TO AID ROBOTICS ENGINEERS IN SENSOR EVALUATION.

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MARINE SPECIALTY INC
PO BOX 3295
E CAMDEN, AR 71701
CONTRACT NUMBER:
G L HANES
TITLE:
UNDERWATER SIGNALLING DEVICE
TOPIC# 192 OFFICE: NSWC IDENT#: 23982

DESIGN AND PRODUCE FUNCTIONAL PROTOTYPE OF A SMALL SELF-CONTAINED ACOUSTIC SIGNAL SOURCE TO BE DEPLOYED AT SEA, WHICH WILL INJECT AN OPERATOR-SELECTED PULSE TRAIN AT SOURCE LEVEL AT 225 dBRE Lu Pa INTO THE WATER AT DEPTHS PRESELECTED FROM 100 TO 1500 FEET. PULSE TRAIN ACCURACY SHALL BE BETTER THAN 50 MILLISECONDS; PULSE DURATION SHALL BE LESS THAN 250 MILLISECONDS. A MULTI-REDUNDANT SAFETY AND ARMING SEQUENCE WILL ENSURE OPERATIONAL SAFETY.

MARKO MATERIALS INC
144 RANGEWAY RD
NORTH BILLERICA, MA 01862
CONTRACT NUMBER:
DR SUNIL C JHA
TITLE:
TITANIUM ALUMINIDE ALLOYS PREPARED VIA RAPID SOLIDIFICATION TECHNOLOGY
TOPIC# 99 OFFICE: NAVSEA IDENT#: 24783

ALLOYS BASED ON INTERMETALLIC Ti(3)Al HAVE BEEN RECOGNIZED AS POTENTIAL MATERIALS TO BE DEVELOPED FOR HIGH TEMPERATURE APPLICATIONS IN ADVANCED WEAPON SYSTEMS AND AEROSPACE VEHICLES. TITANIUM ALUMINIDES POSSES LOW DENSITY, HIGH STRENGTH AND GOOD OXIDATION RESISTANCE, BUT SUFFER FROM POOR ROOM TEMPERATURE DUCTILITY. THE MAJOR CAUSES FOR LOW ROOM TEMPERATURE DUCTILITY HAVE BEEN IDENTIFIED AS (1) EXTENSIVE PLANAR SLIP AND (2) LIMITED NUMBER OF SLIP SYSTEMS DUE TO THE ORDERED CRYSTAL STRUCTURE OF Ti(3)Al. EXTENSIVE PLANAR SLIP LEADS TO STRESS CONCENTRATION AT THE GRAIN BOUNDARIES. SUITABLE

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MICROSTRUCTURAL MODIFICATIONS CAN BE MADE THROUGH ALLOYING AND PROCESSING TO CIRCUMVENT THESE PROBLEMS. WE PROPOSE A RESEARCH PROJECT TO STUDY THE STRUCTURE AND PROPERTIES OF MICRO-ALLOYED TITANIUM ALUMINIDES PROCESSED VIA RAPID SOLIDIFICATION TECHNOLOGY. Ti(3)Al WILL BE ALLOYED WITH BETA STABILIZER, Mo, AND MICRO-ALLOYED WITH BORON AND CARBON. Mo WILL BE ADDED TO RETAIN CERTAIN AMOUNT OF BCC PHASE IN ORDER TO PROMOTE DUCTILITY. MICRO-ALLOYING WITH B AND C IS EXPECTED TO IMPROVE THE GRAIN BOUNDARY COHESIVITY. RAPID SOLIDIFICATION PROCESSING WILL LEAD TO AN EXTREMELY FINE GRAIN STRUCTURE, WHICH WILL REDUCE THE SLIP-DISTANCE TO DECREASE STRESS CONCENTRATIONS AT THE GRAIN BOUNDARIES. A RANGE OF ALLOY COMPOSITONS WILL BE STUDIED, AND THE MECHANICAL PROPERTIES OF MODIFIED Ti(3)Al WILL BE EVALUATED AS A FUNCTION OF HEAT TREATMENTS AND MICROSTRUCTURAL CHARACTERIZATION.

MATERIALS SCIENCES CORP
GWYNEDD PLAZA II - BETHLEHEM PIKE
SPRING HOUSE, PA 19477
CONTRACT NUMBER:
DR CHIAN-FONG YEN
TITLE:
ACOUSTIC-ELASTIC WAVE VELOCITIES IN METAL-MATRIX COMPOSITES
TOPIC# 144 OFFICE: NSWC IDENT#: 23626

THE ACOUSTOELASTIC RESPONSE OF COMPOSITES IS EXPECTED TO DEPEND ON THE ACOUSTOELASTIC PROPERTIES OF THE PHASES AS WELL AS THE RESIDUAL AND APPLIED STRESSES IN EACH PHASE OF THE COMPOSITE. THE PROPOSED RESEARCH AIMS AT OBTAINING ANALYTICAL RELATIONSHIPS OF THIS DEPENDENCE IN TWO PHASE MEDIA WITH COMPARATIVELY LARGE VOLUME FRACTIONS OF REINFORCEMENTS. MATHEMATICAL EXPERIMENTS WILL BE CONDUCTED TO DETERMINE THE SIGNIFICANCE OF VARIOUS MATERIAL AND PROCESSING PARAMETERS. IN ADDITION CORRELATION WITH AVAILABLE EXPERIMENTAL DATA WILL BE ATTEMPTED TO DETERMINE THE FEASIBILITY OF THE APPROACH ESPECIALLY FOR ITS APPLICATION TO THE INVERSE PROBLEM, I.E. DETERMINATION OF RESIDUAL STRESSES IN EACH PHASE. SPECIAL EMPHASIS WILL BE PLACED ON CHARACTERIZING THE THERMAL STRAIN BEHAVIOR OF GRAPHITE FIBER REINFORCED METAL MATRIX LAMINATES SUBJECTED TO THERMAL CYCLES. APPLICATION TO PRACTICAL PROBLEMS OF COMPOSITE COMPONENTS WITH MORE COMPLEX ARRANGEMENT OF REINFORCEMENTS IS PROPOSED FOR THE FOLLOWING

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PHASES OF RESEARCH.

MATERIALS SCIENCES CORP
BOX 206-GWYNEDD PLAZA II/BETHLEHEM PIKE
SPRING HOUSE, PA 19477
CONTRACT NUMBER:
KENT W BUESKING
TITLE:
IMPACT DAMAGE CHARACTERIZATION OF CARBON-CARBON SATELLITE MATERIA
TOPIC# 146 OFFICE: NSWC IDENT#: 23640

CARBON-CARBON COMPOSITES ARE BEING CONSIDERED AS FUTURE SATELLITE MATERIALS BECAUSE THEY EXHIBIT HIGH STIFFNESS, LOW DENSITY, NEAR ZERO THERMAL EXPANSIONS, AND EXCELLENT THERMAL SHOCK RESISTANCE. THESE SATELLITES MUST BE DESIGNED TO WITHSTAND ATTACKS FROM LASER, NUCLEAR AND KINETIC ENERGY WEAPONS. THE THERMAL SHOCK RESISTANCE OF CARBON-CARBONS WILL CONTRIBUTE TO COMPONENTS THAT CAN SURVIVE LASER AND NUCLEAR ATTACKS. HOWEVER, THE LOW CROSS-PLY TENSION AND SHEAR STRENGTHS OF CARBON-CARBON COMPOSITES IMPLY THAT THEY MAY BE PARTI-CULARLY SUSCEPTABLE TO IMPACT DAMAGE. THE PURPOSE OF THE PROPOSED PROGRAM IS TO PROVIDE A PRELIMINARY EVALUATION OF THE EFFECTS OF IMPACT DAMAGE UPON THE STRUCTURAL BEHAVIOR OF CARBON-CARBON SATELLITE MATERIALS. THE PROGRAM INCLUDES ANALYTICAL TASKS TO COMPUTE THE THEORETICAL BEHAVIOR OF PARTICULAR TYPES OF DAMAGE, MANUFACTURING TASKS TO MEASURE THE STRUCTURAL BEHAVIOR OF DAMAGE MATERIAL. THE PROPOSED PROGRAM FOCUSES UPON THE EVALUATION OF THIN-WALLED CYLINDRICAL CARBON-CARBON TUBES WITH HOLES AND DELAMINATIONS TO REPRESENT THE IMPACT DAMAGE.

MATERIALS SCIENCES CORP
GWYNEDD PLAZA II - BETHLEHEM PIKE
SPRING HOUSE, PA 19477
CONTRACT NUMBER:
DR SAILENDRA N CHATTERJEE
TITLE:
ANALYSIS OF EFFECTS OF MICROSTRUCTURE AND GEOMETRY OF GUIDED ELASTIC WAVES
TOPIC# 169 OFFICE: NSWC IDENT#: 23835

SUBMITTED BY

ANALYTICAL STUDIES WILL BE PERFORMED FOR OBTAINING DISPERSION RELATIONS BETWEEN WAVE VELOCITIES AND WAVE LENGTHS FOR PLATE WAVE MOTIONS IN LAMINATED PLATES MADE OF ORIENTED TRANSVERSELY ISOTROPIC FIBER COMPOSITE LAYERS. GROUP VELOCITIES, MODE SHAPES, STRESS AMPLITUDES AND DIRECTION OF ENERGY FLUX VECTOR FOR VARIOUS DIRECTIONS OF WAVE NORMAL AND THEIR IMPLICATIONS IN ULTRASONIC WAVE PROPAGATION STUDIES IN SINGLE LAYER AND SOME MULTIPLE LAYER PLATES WILL BE STUDIED.

MEKTRONIX TECHNOLOGY INC
96 ALPINE DR
GOLETA, CA 93117
CONTRACT NUMBER:
GREGORY T MAYWORM
TITLE:
SHAPE MEMORY ALLOY SERVO ACTUATORS
TOPIC# 162 OFFICE: NSWC IDENT#: 23768

THE RECENT RESURGENCE OF RESEARCH ACTIVITIES ON SHAPE MEMORY ALLOYS (SMA) HAS ADVANCED THEIR APPLICATION INTO NEW AREAS. BY CONTROLLING THE ALLOYING MATERIALS AND INGREDIENTS, THE SHAPE TRANSFORMATION CAN BE MADE TO OCCUR AT PRECISE TEMPERATURES, THUS ENABLING SMAs TO FIND APPLICATIONS IN THERMOSTAT ACTUATORS AND COUPLINGS. BY TAKING ADVANTAGE OF SMA'S DYNAMIC PROPERTIES, ACTIVE CONTROL OF THERMAL HEATING AND COOLING PERMITS THE ALLOY'S USE IN ROBOTIC MANIPULATORS AND MECHANISMS. THE Ti-Ni ALLOY (NITINOL) WILL BE USED DUE TO ITS SUPERIOR STRESS/STRAIN CHARACTERISTICS, HIGH RESILIENCE, AND CORROSION RESISTANCE. THREE TYPES OF POSITIONING DEVICES ARE TO BE IMPLEMENTED AND ANALYZED TO OBTAIN ENGINEERING DATA ON THEIR PERFORMANCE CAPABILITIES; A TRANSLATIONAL ACTUATOR, A ROTATIONAL ACTUATOR, AND AN ACTIVE CATHETER. JOULE HEATING WILL BE USED AS THE CONTROL MECHANISM DUE TO Ti-Ni'S HIGH RESISTIVITY. A POSITION FEEDBACK CONTROL LOOP WILL BE ESTABLISHED BY MONITORING THE RESISTANCE OF Ti-Ni WIRE DURING ITS PHASE TRANSFORMATION. NEW CONTROL ELECTRONICS WILL BE DEVELOPED TO PROVIDE GENERAL PURPOSE CONTROL OF SMA SERVO ACTUATORS. POSITION AND FORCE CONTROL WILL BE DEMONSTRATED USING AN EXTERNAL POSITION ENCODER. ADDITIONAL STUDIES ARE PLANNED INCLUDING THE FEASIBILITY OF USING SEMICONDUCTOR

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THERMALELECTRIC COOLING OF SMA WIRE.

MEMBRANE DEVELOPMENT SPECIALIST - MDS
1313-E SIMPSON WY
ESCONDIDO, CA 92025
CONTRACT NUMBER:
LARRY A LIEN
TITLE:
DEVELOPMENT OF A HIGH RELIABILITY DIESEL FUEL INJECTION SYSTEM
TOPIC# 89 OFFICE: NAVSEA IDENT#: 24572

FUEL CONTAMINATION IS A MOST ACUTE PROBLEM IN DIESEL ENGINES, BECAUSE THE FUEL INJECTION SYSTEM CAN BECOME CLOGGED AND ADVERSELY AFFECTED. FUEL CONTAMINATION GENERALLY OCCURS IN THREE FORMS: SOLID; WATER (FREE AND ENTRAINED); AND ANAEROBIC BACTERIA, WHICH ARE INTRODUCED INTO THE FUEL FROM THE STORAGE AND BALLAST SYSTEMS. WATER IS A PARTICULARLY SEVERE PROBLEM BECAUSE IT NOT ONLY CLOGS INJECTORS, BUT PROMOTES ANAEROBIC IRON BACTERIA THAT DIGEST FUEL, RELEASING BY-PRODUCTS OF SULFUR RADICALS, WHICH ATTACK FERROUS TANK MATERIALS AND ADD TO THE PARTICULATE CONTAMINATION. THE INNOVATIVE TECHNOLOGY MDS PROPOSES IS IN TWO STAGES. THE FIRST STAGE USES A PRESSURIZED CROSS-FLOW SPIRAL WOUND ULTRAFILTRATION ELEMENT WITH A HYDROPHOBIC POLYTETRAFLUOROETHYLENE MEMBRANE (TFE) (.02u PORE SIZE). THIS MEMBRANE HAS BEEN PROVEN TO REJECT SOLIDS GREATER THAN.02u, FREE AND ENTRAINED WATER, AND BACTERIA. THE SECOND STAGE ELEMENT RECEIVES THE ULTRACLEAN PRODUCT FROM THE FIRST, BUT OPERATES IN A DEAD HEAD MODE. A PRESSURE SENSITIVE SWITCH IS CONNECTED ACROSS THE SECOND ELEMENT FOR SOUNDING AN ALARM SIGNALING THE PRESENCE OF ANY FOULING CONTAMINANTS.

MERIDIAN CORP
4300 KING ST - STE 400
ALEXANDRIA, VA 22302
CONTRACT NUMBER:
BRADLEY S MacALEER
TITLE:
COMPUTER REQUIREMENTS FOR EXPEDITING RDP ACTIONS AND CONTRACT DOCUMENTATION
TOPIC# 125 OFFICE: NAVSEA IDENT#: 24975

SUBMITTED BY

A PERMANENT NEED EXISTS FOR AN AUTOMATED PROGRAM MANAGEMENT SYSTEM WHICH OVERSEES CERTAIN ASPECT OF THE PROCUREMENT PROCESS. AN AUTOMATED PROCUREMENT ACQUISITION MANAGEMENT SYSTEM WOULD PROVIDE THE MEANS TO TRACK THE COMPLETE LIFE CYCLE OF THE SYSTEM ACQUISITION, FROM THE PROCUREMENT REQUEST THROUGH THE CHANGES WHICH OCCUR DURING CONTRACTUAL OBLIGATION. THIS PHASE I EFFORT PROPOSES DEVELOPING A RELATIONAL DATA BASE MANAGEMENT SYSTEM THAT WOULD OPERATE IN A WINDOWS ENVIROMENT PROVIDING FOR A USER FRIENDLY, "MOUSE" ACTIVATED, PULL-DOWN MENU SYSTEM TO FACILITATE RFP GENERATION AND CONTRACT MONITORING. A "WINDOWS" ENVIRONMENT WILL ALLOW, THROUGH DYNAMIC DATA EXCHANGE, CONCOMITANT WORDPROCESSING, RELATIONAL DATA BASE MANIPULATION AND "WHAT-IF" ANALYSIS DURING RFP GENERATION AND CONTRACT MONITORING.

MICROALLOYING INTERNATIONAL INC
13100 NORTHWEST FREEWAY - STE 500
HOUSTON, TX 77040
CONTRACT NUMBER:
JAMES T HICKEY
TITLE:
ACCELERATED STRESS CORROSION CRACKING SCREENING TEST METHOD FOR HY-130 STEELS
TOPIC# 84 OFFICE: NAVSEA IDENT#: 24537

THE OVERALL OBJECTIVE OF THE PROPOSED RESEARCH IS TO INVESTIGATE THE USE OF THE ELECTRICAL POTENTIAL DROP TECHNIQUE AS AN ACCELERATED TEST METHOD FOR DETERMINING THE STRESS CORROSION CRACKING RESISTANCE OF HY-130 STEEL WELDMENTS UNDER CATHODIC PROTECTION IN NATURAL SEAWATER AT AMBIENT TEMPERATURES. WELDS WILL BE DEPOSITED IN 1-INCH THICK HY-130 STEEL BUTT JOINTS. COMPACT TENSION FRACTURE-MECHANICS TYPE SPECIMENS WILL BE MACHINED FROM THE WELDS. DUPLICATE SPECIMENS WILL BE TESTED WITH THE FATIGUE CRACK LOCATED IN THE BASE METAL, IN THE HEAT-AFFECTED ZONE (HAZ), AND IN THE WELD METAL. THE RESULTS WILL BE COMPARED TO EXISTING DATA FROM LONG-TERM TESTS.

MICROCOM CORP
965 THOMAS DR
WARMINSTER, PA 18974
CONTRACT NUMBER:
CHARLES ROSEN
TITLE:
FEASIBILITY STUDY ULTRA SMALL TRANSPONDERS FOR MISSILE TEST AND EVALUATION
TOPIC# 226 OFFICE: PMTC IDENT#: 24061

SUBMITTED BY

MICROCOM PROPOSES TO APPLY MODERN RF AND SURFACE MOUNT TECHNOLOGY TO PMTC TRANSPONDER DESIGNS TO GAIN: 1. SIZE/WEIGHT REDUCTION; 2. INCREASED RELIABILITY; 3. IMMPROVED DATA QUALITY; 4. POWER EFFICIENCY IMPROVEMENT, AND 5. COST REDUCTION.

MICROSENSOR SYSTEMS INC
5610 SANDY LEWIS DR
FAIRFAX, VA 22032
CONTRACT NUMBER:
HENRY WOHLTJEN
TITLE:
SAW ARRAY DETECTOR FOR HAZARDOUS VAPORS
TOPIC# 85 OFFICE: NAVSEA IDENT#: 24545

MICROSENSOR SYSTEMS, INC. WILL INVESTIGATE THE USE OF SURFACE ACOUSTIC WAVE (SAW) TECHNOLOGY FOR THE DETECTION OF HAZARDOUS CHEMICAL VAPORS IN A SHIPBOARD ENVIRONMENT. THE APPROACH WILL UTILIZE AN ARRAY OF SOLID-STATE SAW OSCILLATORS THAT HAVE BEEN COATED WITH SORBENTS THAT ARE SPECIFIC FOR THE CHEMICAL VAPORS OF INTEREST, WHICH WILL INCLUDE REPRESENTATIVE TOXIC PRODUCTS OF COMBUSTION AND CHEMICAL AGENT SIMULANTS. THE STUDY WILL REQUIRE SELECTION OF OPTIMAL COATINGS FOR EACH SAW SENSOR IN THE ARRAY, TESTING OF THE PERFORMANCE OF EACH COATED SENSOR WITH POSSIBLE INTERFERING VAPORS AS WLL AS WITH THE SPECIFIC TARGET GASES, AND THE DEVELOPMENT OF A SIMPLE PATTERN RECOGNITION SCHEME TO ANALYZE DATA PRODUCED BY THE SENSOR ARRAY AND IDENTIFY WHEN A PARTICULAR THREAT CONDITION EXISTS. STUDIES WILL BE CARRIED OUT TO DETERMINE THE VARIOUS VAPOR CONCENTRATION LEVELS NEEDED TO ACHIEVE RELIABLE IDENTIFICATION OF A TOXIC THREAT AND HOW FAST SUCH A 4-SENSOR SAW ARRAY CAN ACHIEVE A RELIABLE MEASUREMENT. A FINAL REPORT WILL BE PREPARED SUMMARIZING THE RESULTS OF THE STUDY AND RECOMMENDING THE DIRECTION FOR FURTHER STUDIES.

MICROSENSOR SYSTEMS INC
5610 SANDY LEWIS DR
FAIRFAX, VA 22032
CONTRACT NUMBER:
HENRY WOHLTJEN
TITLE:
SAW DETECTOR FOR FREON VAPORS
TOPIC# 92 OFFICE: NAVSEA IDENT#: 24705

SUBMITTED BY

A METHOD WILL BE INVESTIGATED FOR THE DETECTION OF FREON VAPORS IN THE SHIPBOARD ENVIRONMENT. THE METHOD UTILIZES A SOLID-STATE, SURFACE ACOUSTIC WAVE (SAW) OSCILLATOR THAT HAS BEEN COATED WITH A SORBENT FOR HALOCARBON VAPORS. THE OBJECTIVE OF THE STUDY IS TO OPTIMIZE THE SENSOR'S CHEMICALLY SELECTIVE COATING FOR THE DETECTION OF FREON, TEST THE PERFORMANCE OF THE DEVICE, AND TO DEVELOP A SYSTEM THAT PROVIDES A RELIABLE ALARM WHEN HIGH FREON CONCENTRATIONS EXIST. A SAW SENSOR ARRAY WITH PUMPS, VALVES, DRYER, AND MICROCOMPUTER DATA ACQUISITION SYSTEM WILL BE FABRICATED AND THE DEVICES COATED WITH THE CANDIDATE SORBENTS. THE COATED SENSOR ARRAYS WILL BE EXPOSED TO HALOCARBON VAPORS AND THEIR PERFORMANCE EVALUATED TO ESTABLISH DETECTION LIMITS, RESPONSE TIMES AND SELECTIVES. A FINAL REPORT OF THE FINDINGS WILL BE PREPARED.

MICROWAVE RADIO CORP
847 ROGERS ST
LOWELL, MA 01852
CONTRACT NUMBER:
BRUCE SOKOLIK
TITLE:
LINEAR SOLID STATE MICROWAVE POWER AMPLIFIER
TOPIC# 35 OFFICE: SPAWAR IDENT#: 24359

MICROWAVE RADIO CORPORATION PROPOSES TO PERFORM ADEQUATE STUDY AND TESTING TO SPECIFY A FORM, FIT, AND FUNCTIONAL REPLACEMENT FOR THE TWT AMPLIFIER IN THE AN/FRC-173(v) DRAMA RADIO.

MIKROS SYSTEMS CORP
3828 QUAKERBRIDGE RD
MERCERVILLE, NJ 08619
CONTRACT NUMBER: N60921-88-C-0159
DR JOSEPH R BURNS
TITLE:
A NEW APPROACH TO THE DESIGN OF AN UNDERWATER DATA ACQUISITION SYSTEM
TOPIC# 176 OFFICE: NSWC IDENT#: 23868

SUBMITTED BY

THIS PAPER PRESENTS A NEW APPROACH TO THE DESIGN OF A SELF-CONTAINED UNDERWATER DATA ACQUISITION SYSTEM (UDAS) BASED ON A GENERAL-PURPOSE DIGITAL SIGNAL PROCESSING (DSP) ARCHITECTURE. THE PROPOSED ARCHITECTURE USES A HIGH-PERFORMANCE MILITARY STANDARD SINGLE-CHIP MICROPROCESSOR AS A SYSTEM CONTROLLER. WHEREAS EXISTING SYSTEMS USE SPECIAL-PURPOSE HARDWARE DEDICATED TO SIGNAL PROCESSING FUNCTIONS, IN THE PROPOSED APPROACH THIS HARDWARE IS REPLACED BY SOFTWARE WHICH EMBODIED STANDARD DSP ALGORITHMS. THIS APPROACH ALLOWS THE IMPLEMENTATION OF A RECONFIGURABLE UDAS WHICH MAY BE TAILORED TO APPLICATION-SPECIFIC REQUIREMENTS SIMPLY BY CHANGING THE CONTROLLER SOFTWARE. THE PROPOSED DSP ARCHITECTURE IS BASED ON A DESIGN PREVIOUSLY DEVELOPED BY MIKROS FOR USE AS THE CONTROLLER OF A US NAVY LINK-11 DATA TERMINAL. SINCE THE LINK-11 NETWORK USES 16 AUDIO TONES TO MODULATE AN RF CARRIER, IT IS ANTICIPATED THAT A SIMILAR CONTROLLER DESIGN CAN BE USED TO PROVIDE A GENERAL-PURPOSE UDAS. THE PROPOSED PROGRAM WILL DEFINE THE APPLICATION INTERFACES AND ALGORITHMS, INVESTIGATE THE APPLICABILITY OF THE EXISTING DESIGN, ASSESS PACKAGING AND ENVIRONMENTAL CONSTRAINTS, AND PRESENT A PRELIMINARY DESIGN OF A COMPACT LOW-POWER RECONFIGURABLE UDAS.

MO-SCI CORP
PO BOX 2 - TWITTY IND PK/MEAD BLDG
ROLLA, MO 65401
CONTRACT NUMBER:
JOHN KOEN
TITLE:
PREPARATION AND EVALUATION OF SUPERCONDUCTING FIBERS OF FILAMENTS IN THE SYSTEM Y-Ba-Cu-O
TOPIC# 165 OFFICE: NSWC IDENT#: 23809

THE RECENT DISCOVERY OF HIGH -T(c) OXIDE SUPERCONDUCTORS HAS CREATED HIGH INTEREST IN FABRICATING THESE MATERIALS INTO FORMS SUITABLE FOR PRACTICAL APPLICATIONS. THE PURPOSE OF THE PROPOSED RESEARCH IS TO INVESTIGATE THE FEASIBILITY OF FABRICATING SUPERCONDUCTING FIBERS OR FILAMENTS FROM MELTS IN THE Y-Ba-Cu-O SYSTEM. PRODUCING FIBERS DIRECTLY FROM THE MELT HAS THE POTENTIAL FOR YIELDING DENSE AND MECHANICALLY STRONG SUPERCONDUCTORS WITH EXCELLENT CHEMICAL HOMOGENEITY.

SUBMITTED BY

MONTEREY TECHNOLOGIES INC
PO BOX 223699 - 26350 CARMEL RANCHO LN
CARMEL, CA 93922
CONTRACT NUMBER:
ROBERT T HENNESSY
TITLE:
OPTIMAL COLOR SELECTION FOR THE E-2C ENHANCED DISPLAY UNIT
TOPIC# 72 OFFICE: NAVAIR IDENT#: 24513

WORK IS PROPOSED TO PROVE THE FEASIBILITY OF DEVELOPING AN OPTIMAL METHOD FOR DETERMINING COLOR CODING FOR MILITARY AIRCRAFT DISPLAYS, SPECIFICALLY, THE E-2C ENHANCED MAIN DISPLAY UNIT (EMDU). THE PHASE I WORK WILL: 1) PRODUCE RECOMMENDATIONS FOR COLOR CODING AND ONE OR MORE COLOR SETS FOR THE E-2C EMDU; 2) DEMONSTRATE THE PRACTICALITY AND UTILITY OF A RULE BASED PROCEDURE FOR COLOR CODING SPECIFICATION AND AN ALGORITHMIC PROCEDURE FOR SELECTION OF MAXIMALLY DISCRIMINABLE COLORS. THE CODING RULES WILL BE DEVELOPED FROM CURRENT COLOR CODING PRINCIPLES. THE COLOR SET SPECIFICATION (IN CIE 1931 OR 1976 CIELUV CHROMATICITY COORDINATES) WILL BE THE PRODUCT OF A COLOR DIFFERENCE ALGORITHM TO BE DEVELOPED FROM RECENTLY PUBLISHED RESEARCH ON COLOR SELECTION. IN PHASE II THE CODING RULES AND COLOR SELECTION ALGORITHM DEVELOPED IN PHASE I WILL BE INTEGRATED, AND PARTIALLY AUTOMATED TO PRODUCE A RELATIVELY SIMPLE AND EASILY USED COMPUTER-AIDED DESIGN/EXPERT SYSTEM FOR DETERMINING COLOR CODING SUITES FOR A WIDE VARIETY OF MILITARY AIRCRAFT DISPLAYS. THIS SYSTEM WILL ALLOW DESIGN ENGINEERS AND OTHERS TO MAKE OPTIMAL USE OF COLOR TO HIGHLIGHT, GROUP AND SEGREGATED INFORMATION IN COMPLEX, MULTIDIMENSIONAL DISPLAYS.

MRM ENGINEERS
918 PARK AVE
PITTSBURGH, PA 15234
CONTRACT NUMBER:
R RAVINDRANATHAN
TITLE:
CERAMIC SUPERCONDUCTORS
TOPIC# 158 OFFICE: NSWC IDENT#: 23742

SUBMITTED BY

DEVELOP A SOL-GEL PROCESSING TECHNIQUE TO PREPARE CERAMIC OXIDE SUPERCONDUCTORS AND MAKE MATERIALS AND COATINGS TO INCORPORATE INTO DOD DEVICES.

MSNW INC
PO BOX 865
SAN MARCOS, CA 92069
CONTRACT NUMBER:
DR GEORGE H REYNOLDS
TITLE:
IMPROVED THERMOCHEMICAL STABILITY IN CARBON-REINFORCED BORIDE MATRIX COMPOSITES
TOPIC# 145 OFFICE: NSWC IDENT#: 23632

REFRACTORY BORIDE MATRICES (ZrB(2), HfB(2)) REINFORCED WITH HIGH MODULUS CARBON FIBERS SHOW PROMISE AS ULTRAHIGH TEMPERATURE STRUCTURAL MATERIAL. THE MAXIMUM USE TEMPERATURE IS LIMITED BY THE MUTUAL REACTIVITY OF THE CONSTITUENT MATERIALS AND THE FORMATION OF LIQUID PHASES WITH SIGNIFICANTLY LOWER MELTING TEMPERATURES THAN EITHER THE MATRIX OR REINFORCING PHASE. THE PROPOSED RESEARCH WILL EXAMINE, THROUGH DETAILED THERMOCHEMICAL MODELING, THE FEASIBILITY OF INTERMETALLIC COMPOUND AND OTHER INTERFACIAL BARRIER LAYERS TO RETARD DIFFUSIVE TRANSPORT BETWEEN THE MATRIX AND REINFORCING PHASES, THUS PERMITTING UTILIZATION OF THESE COMPOSITES AT HIGHER TEMPERATURES FOR LONGER PERIODS OF TIME.

MSNW INC
PO BOX 865
SAN MARCOS, CA 92069
CONTRACT NUMBER:
DR GEORGE H REYNOLDS
TITLE:
MULTIFUNCTIONAL COATINGS FOR CARBON-CARBON COMPOSITES
TOPIC# 147 OFFICE: NWSC IDENT#: 23661

THE PROPOSED RESEARCH WILL EXAMINE THE USE OF MODEL REFRACTORY AND

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LIGHT METAL COATINGS ON CARBON-CARBON COMPOSITE SUBSTRATES FOR THE MULTIPLE FUNCTIONALITIES OF RESISTANCE TO ATOMIC OXYGEN EFFECTS EXPECTED IN LOW EARTH ORBIT, HIGH POWER C.W. LASER EFFECTS BEFORE AND AFTER EXPOSURE TO ATOMIC OXYGEN, AND NUCLEAR EFFECTS. PROTOTYPE VAPOR DEPOSITED REFRACTORY AND LIGHT METAL COATINGS ON CARBON-CARBON SUBSTRATES WILL BE EXPOSED TO THE EQUIVALENT OF A SIGNIFICANT ATOMIC OXYGEN FLUENCE AND THEN TESTED FOR RESISTANCE TO HIGH POWER LASERS. SURFACE ANALYSIS STUDIES AND OPTICAL PROPERTY MEASUREMENTS WILL BE PERFORMED ON AS-PRODUCED COATINGS, COATING EXPOSED TO ATOMIC OXYGEN, COATINGS WHICH HAVE BEEN LASER TESTED, AND COATINGS EXPOSTED TO ATOMIC OXYGEN AND THEN LASER TESTED. THE EXPERIMENTAL APPROACH IS DESIGNED TO PROVIDE INFORMATION ON THE MECHANISTICS OF DEGRADATION AND PROTECTION WHICH CAN BE USED FOR DESIGN OF OPTIMIZED COATINGS FOR APPLICATION TO CARBON-CARBON COMPOSITE STRUCTURAL ELEMENTS FOR SPACECRAFT. THE PROJECT WILL BE PERFORMED WITH THE ENGINEERING AND EXPERIMENTAL ASSISTANCE OF LOCKHEED MISSILE AND SPACE CORPORATION AND THE RICE UNIVERSITY LASER APPLICATIONS CENTER.

MacAULAY-BROWN INC
3915 GERMANY LN
DAYTON, OH 45431
CONTRACT NUMBER:
JAMES UTT
TITLE:
ANALYSIS OF CURRENT THREAT/CLUTTER DISCRIMINATION TECHNIQUES FOR IRST SYSTEMS
TOPIC# 177 OFFICE: NSWC IDENT#: 23871

MUCH RESEARCH HAS BEEN PUBLISHED RECENTLY CONCERNING THE PROBLEM OF PROCESSING DATA COLLECTED BY IRST TYPE SENSORS. SPECIFICALLY, THE PROBLEM OF TARGET DISCRIMINATION (I.E., "THREAT" OR "NON-THREAT") HAS RECEIVED CONSIDERABLE ATTENTION. TECHNOLOGY HAS NOT KEPT PACE WITH THIS RESEARCH. MOST IR "TRACK PROCESSORS" STILL RELY UPON VARIATIONS OF THE SAME STRUCTURE AND DISCRIMINATION ALGORITHMS WHICH WERE DEVISED WITH THE ORIGINAL IR SENSORS. THESE TECHNIQUES WERE NECESSARILY SOMEWHAT AD HOC IN NATURE. THIS EFFORT WOULD PERFORM A COMPREHENSIVE STUDY OF DISCRIMINATION ALGORITHMS PRESENTED IN RECENT LITERATURE. THE MOST VIABLE OF THESE WILL BE EVALUATED USING A CURRENTLY EXITING, HIGHLY MODULAR TRACK PROCESSOR AS A TEST VEHICLE.

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CONSIDERATION WILL ALSO BE GIVEN TO THE RELATED PROBLEM OF TRACK MAINTENANCE. AN EFFECTIVE SOLUTION WILL BE PRESENTED. FINALLY, A STUDY WILL BE MADE TO ASSESS THE APPLICABILITY OF NON-VON NEUMAN ARCHITECTURE COMPUTERS TO TRACK PROCESSING. A PRELIMINARY DESIGN, BASED ON THESE STUDIES, FOR AN OPTIMAL TRACK PROCESSOR WILL RESULT.

NETROLOGIC INC
4241 JUTLAND DR
SAN DIEGO, CA 92117
CONTRACT NUMBER:
DAN GREENWOOD
TITLE:
USING NEURAL NETWORKS TO RECOGNIZE AGILE EMITTERS: A FEASIBILITY ANALYSIS
TOPIC# 240 OFFICE: NOSC IDENT#: 24152

POWERFUL INFORMATION PROCESSING DEVICES CALLED, NEURAL NETWORKS, ARE CURRENTLY BEING APPLIED TO PROBLEMS IN SPEECH RECOGNITION, COMPUTER VISION, MULTI-DIMENSIONAL PROBABILITY DENSITY FUNCTION ESTIMATION, COMBINING UNCERTAIN KNOWLEDGE, AND OTHER DIFFICULT INFORMATION PROCESSING PROBLEMS. THE RESEARCH PROPOSED HEREIN IS AIMED AT ASSESSING THE POTENTIAL OF NEURAL NETWORKS IN SOLVING THE MOST DIFFICULT PROBLEM FACING MODERN NAVAL ELECTRONIC SUPPORT MEASURES (ESM) SYSTEMS, NAMELY, RECOGNIZING EMITTERS WITH TIME VARYING BASIC PARAMETERS IN REAL TIME IN A DENSE RF ENVIRONMENT. NETROLOGIC PROPOSES A RESEARCH PROGRAM CONSISTING OF THREE SUCCESSIVE STAGES: 1) PROBLEM DEFINITION -SPECIFYING THE PROBLEM EMITTER CHARACTERISTICS AS WELL AS SENSOR AND ENVIRONMENTAL PROPERTIES, 2) NETWORK CONFIGURATION -DESIGNING THE NEURAL-NETWORK AND ASSOCIATED CONVENTIONAL PROCESSING TO PERFORM THE RECOGNITION TASK, 3) NETWORK IMPLEMENTATION -SPECIFYING THE COMPUTATIONAL CHARACTERISTICS TO ENABLE A COST-EFFECTIVE AND PRACTICAL IMPLEMENTATION.

NICHOLS RESEARCH CORP
4040 S MEMORIAL PKWY
HUNTSVILLE, AL 35802
CONTRACT NUMBER:
GREGORY R McNEILL
TITLE:
CLUTTER REJECTION SIGNAL PROCESSING
TOPIC# 15 OFFICE: ONT IDENT#: 24188

SUBMITTED BY

THE USS STARK AND HMS SHEIFIELD PROVIDE GRAPHIC DEMONSTRATIONS OF CURRENT ANTISHIP MISSILE EFFECTIVENESS. PROVIDING PASSIVE LOW FALSE ALARM RATE DETECTION AND TRACK OF MISSILE TARGETS FOR US NAVAL SURFACE COMBATANTS PROMISES IMPROVED ATTACK WARNING TIMES, STEALTH AND WEAPONS TARGETING. THIS EFFORT WILL INVESTIGATE A NUMBER OF PROMISING APPROACHES TO REJECTING CLUTTER IN INFRARED SEARCH AND TRACK SETS (IRSTS) TO ACHIEVE THESE GOALS. THE ALGORITHMS PROPOSED FOR INVESTIGATION FALL INTO TWO BROAD CLASSES; THE FIRST ARE NONLINEAR SPATIAL FILTERS OF THE MEDIAL TYPE. HISTORICALLY, NONLINEAR FILTERS WHEN FOUND, OFFER SUPERIOR PERFORMANCE TO LINEAR FILTERS. THE SECOND ALGORITHM CLASS FALLS UNDER THE HEADING OF VELOCITY HYPOTHESIS TESTING (VHT). THIS APPROACH REMOVES STRONGLY CORRELATED BACKGROUND CLUTTER USING A SIMPLE LOW PASS SPATIAL FILTER. THE LARGELY UNCORRELATED HIGH SPATIAL FREQUENCY BACKGROUND REMAINS. THE RESIDUAL SCENES ARE THEN SHIFTED AND AVERAGED OVER MULTIPLE FRAMES FOR ALL POSSIBLE TARGET VELOCITIES. THE AVERAGED FRAME SET OR SETS THAT ARE SHIFTED AT THE EMBEDDED TARGET VELOCITIES WILL HAVE TARGET SIGNAL ADDED CONSTRUCTIVELY AND THUS PROVIDE TARGET DETECTION. PRELIMINARY RESULTS WITH THIS APPROACH APPEAR QUITE PROMISING. IF SUCCESSFUL, SIGNIFICANT IMPROVEMENT OVER CURRENT SYSTEM PERFORMANCE IS LIKELY.

NIELSEN ENGINEERING & RESEARCH INC
510 CLYDE AVE
MOUNTAIN VIEW, CA 94043
CONTRACT NUMBER:
DR MARNIX F E DILLENIUS
TITLE:
ANALYSIS OF LOW FLYING MISSILES VERSUS VARIOUS SEA STATES
TOPIC# 76 OFFICE: NAVSEA IDENT#: 24652

A PROGRAM OF WORK IS PROPOSED LEADING TO THE PREDICTION AND UNDERSTANDING OF THE AERODYNAMICS ACTING ON A MISSILE OR AN AIRPLANE FLYING AT LOW ALTITUDE OVER THE SEA SURFACE. IT APPEARS THAT CLOSE TO THE SEA SURFACE, THE UNSTEADY NATURE OF THE AMBIENT AIR IS OF SUFFICIENTLY HIGH FREQUENCY TO CAUSE LAGS IN THE AERODYNAMIC RESPONSE OF THE MISSILE DUE TO THE GUSTS ACTING ON IT. THIS PHENOMENON CAN ONLY BE REPRESENTED BY AN UNSTEADY AERODYNAMIC ANALYSIS. SPECIFICALLY, THE UNSTEADY AERODYNAMIC EFFECTS INDUCED BY VARIOUS

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SEA STATES WILL BE INVESTIGATED FOR A VEHICLE FLYING AT SUBSONIC, TRANSONIC, OR SUPERSONIC SPEEDS ABOVE THE SEA WAVES. IN THE PHASE I WORK, THE FLYING VEHICLE WILL BE SIMPLIFIED TO ONE AIRFOIL OR TO TWO AIRFOILS A SHORT DISTANCE APART. A TWO-DIMENSIONAL, UNSTEADY TRANSONIC SMALL DISTURBANCE CODE WILL BE MODIFIED TO INCLUDE THE VEHICLE GUSTS AND WAVY WALL EFFECTS INDUCED BY THE SEA WAVES ON THE AERODYNAMICS OF THE VEHICLE. IT IS ANTICIPATED THAT THE RESULTS OF THE PHASE I WORK WILL INCLUDE THE UNSTEADY AERODYNAMIC FORCES AND MOMENTS (IN THE PITCH PLANE) AND PHASE LAGS FOR VARIOUS COMBINATIONS OF SEA STATES AND MISSILE/VEHICLE VELOCITIES. LEVEL FLIGHT AND PLUNGING VEHICLE MOTION WILL BE CONSIDERED. CONDITIONS FOR WHICH QUASI-STEADY AERODYNAMIC ANALYSIS IS VALID WILL BE DEFINED.

NKF ENGINEERING INC (ARCTIC TECH GP)
8335 GUILFORD RD
COLUMBIA, MD 21046
CONTRACT NUMBER:
LAWRENCE A SCHULTZ
TITLE:
ICE SHEDDING MATERIALS FOR SURFACE SHIP APPLICATIONS
TOPIC# 86 OFFICE: NAVSEA IDENT#: 24559

OPSIDE ICING WILL BE ONE OF THE MAJOR IMPEDIMENTS TO SUCCESSFUL U.S. NAVY SURFACE SHIP OPERATIONS AT HIGH LATITUDES. NONE OF THE WIDE VARIETY OF ANTI-ICING AND DE-ICING TECHNIQUES IDENTIFIED TO DATE HAS OFFERED MORE THAN VERY LIMITED PROMISE. SINCE COMBAT READINESS AND SHIP SAFETY CAN BE SEVERELY IMPAIRED BY TOPSIDE ICING, IT IS PROPOSED THAT EXISTING AND EMERGING MATERIALS TECHNOLOGIES AND CONCEPTS BE IDENTIFIED WHICH CAN PREVENT OR REDUCE ICE BUILD-UP AND/OR EASE REMOVAL OF THE ICE. THE TECHNOLOGY SEARCH WILL BE COMPREHENSIVE IN SCOPE, COVERING DOMESTIC AND FOREIGN, GOVERNMENT AND COMMERCIAL SOURCES. THE SEARCH WILL COVER THE TECHNICAL LITERATURE, MATERIALS MANUFACTURERS, SHIP OPERATORS, AND RESEARCHERS, AND WILL DRAW HEAVILY UPON THE LONG-ESTABLISHED AND CURRENT PERSONAL CONTACTS THE STAFF OF THE NKF ARCTIC TECHNOLOGY GROUP HAS WITHIN THE ARCTIC ENGINEERING COMMUNITY. AN ASSESSMENT METHODOLOGY WILL BE DEVELOPED FOR USE IN RANKING THE MATERIALS TECHNOLOGIES AND CONCEPTS, THE MATERIALS TECHNOLOGIES AND CONCEPTS WILL BE RANKED, AND AN OUTLINE OF THE REQUIRED ACTIONS NECESSARY TO REALIZE RELIABLE APPLICATION

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OF THE SELECTED TECHNOLOGIES AND CONCEPTS WILL BE PREPARED.

NORTHWEST TECHNICAL INDUSTRIES INC
547 DIAMOND POINT RD
SEQUIM, WA 98382
CONTRACT NUMBER:
ALAN W HARE
TITLE:
EXPLOSIVE POWDER COMPACTION OF TORPEDO HULLS
TOPIC# 114 OFFICE: NAVSEA IDENT#: 24905

TORPEDO SHELLS ARE MACHINED FROM ALUMINUM TUBES USING EXPENSIVE MACHINING METHODS. BY USING EXPLOSIVE LOADS TO CONSOLIDATE ALUMINUM POWDERS, TUBES COULD BE MANUFACTURED AT NEAR NET SHAPE TO REDUCE MACHINING COSTS. ANOTHER ADVANTAGE OF THIS TECHNIQUE IS THAT THE ALUMINUM POWDER CAN EASILY BE REINFORCED WITH MATERIAL SUCH AS SILICON CARBIDE CREATING A COMPOSITE WHICH HAS A HIGHER STRENGTH TO WEIGHT RATIO THAN WROUGHT AND CAST ALUMINUM. A SUCCESSFUL PHASE I OF THIS PROGRAM WOULD DEVELOP THE NECESSARY PROCESSING PARAMETERS TO MANUFACTURE ALUMINUM TUBES REINFORCED WITH SILICON CARBIDE. THESE PARAMETERS COULD THEN BE USED DURING PHASE II TO BUILD SOME PROTOTYPE TORPEDO SHELLS.

NSSI TECHNOLOGIES
2610 POTTERS RD
VIRGINIA BEACH, VA 23452
CONTRACT NUMBER:
DR WILLIAM C NUNNALLY
TITLE:
IMPULSE RADAR TECHNOLOGY
TOPIC# 98 OFFICE: NAVSEA IDENT#: 24777

THE OBJECTIVES ARE TO IDENTIFY EXISTING TECHNOLOGY APPLICABLE TO SUBNANOSECOND IMPULSE RADAR DEVELOPMENT. HARDWARE SOURCE WILL BE IDENTIFIED THAT MAY OFFER HIGH POWER, SUBNANOSECOND, PHOTO-CONDUCTIVE SWITCHES AND FAST TRIGGER LASERS, LOW NOISE, VERY WIDEBAND, NONDISPERSIVE EM RECEIVERS, AND WIDEBAND NONDISPERSIVE EMITTER ELEMENT

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SUITABLE FOR MATCHING SUBNANOSECOND BASEBAND PULSE TO FREE SPACE RADIATION. THESE OBJECTIVES WILL BE DEVELOPED WITH COMPLEMENTARY INVESTIGATION INTO KEY ISSUES RELEVANT TO THE OBJECTIVES. KEY ISSUES INCLUDE THE FEASIBILITY FOR RECEIVER DEVELOPMENT, THE EFFICIENCY IN AN IMPEDANCE MATCH FROM ANTENNA TO FREE SPACE, THE ABILTY TO CREATE THE PULSE OFF-RAMP AS FAST AS ITS ON-RAMP, THE FEASIBILITY TO CONSTRUCT A TIMED ARRAY FOR OVERLAP AND STEERING, THE ADEQUACY OF POWER ON TARGET IN THE SUMMED PULSE, THE EFFICIENCY OF ENERGY CONVERSION, THE MATERIAL LIMITATIONS OF THE SWITCH DEVICE, AND LASER LIMITATION OF THE SWITCH DEVICE, AND LASER LIMITATIONS OF THE SWITCH DEVICE, AND LASER LIMITATIONS. THE PROJECT WITH BE PERFORMED BY NSSI TECHNOLOGIES TECHNICAL PERSONNEL WITH THE ASSISTANCE OF CONTRACT CONSULTANTS AT THE UNIVERSITY OF TEXAS, ARLINGTON. THE SCOPE OF EFFORT IS EXPECTED TO BE COMPLETED WITHIN THREE MONTHS.

NUCLEAR & AEROSPACE MATERIALS CORP
16716 MARTINCOIT RD
POWAY, CA 92064
CONTRACT NUMBER:
GLEN B ENGLE
TITLE:
CARBON-CARBON COMPOSITES FOR THERMAL MANAGEMENT OF HIGH HEATING LOADS
TOPIC# 96 OFFICE: NAVSEA IDENT#: 24765

THERE IS A NEED FOR LIGHTWEIGHT C/C COMPOSITES THAT CAN BE TAILORED TO MANAGE RAPIDLY GENERATED, VERY HIGH HEAT LOADS IN ELECTRONIC COMPONENTS AND SPACE AND MISSILE STRUCTURES FOR NAVSEA WEAPON SYSTEMS. THE INNOVATION IN THIS PROGRAM IS TO UTILIZE A HIGH CHAR YIELD MESOPHASE PITCH AND B(4)C DOPED PITCH AS MATRIX PRECURSORS TO FABRICATE C/C COMPOSITES FOR NAVSEA WEAPON SYSTEMS. C/C COMPOSITES OF VERY HIGH THERMAL CONDUCTIVITY WILL BE FABRICATED BY REINFORCING A MESOPHASE PITCH CARBON MATRIX WITH HIGHLY CONDUCTING P130X PITCH BASED CARBON FIBERS. THE JP130X FIBERS HAVE A THERMAL CONDUCTIVITY OF ABOUT 1140 W/m.k. MESOPHASE PITCH CARBON WILL ALIGN THE FIBERS TO PRODUCE A "SHEATH EFFECT" THAT SHOULD ENHANCE THE THERMAL CONDUCTIVITY AND MODULUS OF THE FIBER BUNDLES. ADDITION OF B(4)C TO A PITCH CARBON MATRIX SHOULD INCREASE THE THERMAL EXPANSIVITY AND ELASTIC MODULUS OF THE MATRIX. THE COMPOSITIES WILL

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BE HEATED ABOVE 2000 DEGREES C TO DEVELOP HIGH THERMAL CONDUCTIVITY IN THE MATRICES. A FINAL DENSIFICATION WITH CVI PYROCHARBON IS EXPECTED TO FURTHER INCREASE THE THERMAL CONDUCTIVITY OF THE COMPOSITIES AND IMPROVE THEIR STRENGTH AND TOUGHNESS. STRUCTURAL EVALUATION AND MEASUREMENT OF THERMAL AND MECHANICAL PROPERTIES WILL PROVDIE A DATA BASE. PHASE I RESEARCH IS EXPECTED TO DEMONSTRATE THE CONCEPTS AND PROVIDE A BASIS FOR PHASE II RESEARCH.

OPHIR CORP
3190 S WADSWORTH BLV - STE 100
LAKEWOOD, CO 80227
CONTRACT NUMBER:
DR LOREN D NELSON
TITLE:
AN OCEANIC MICROTHERMAL SENSOR TECHNOLOGY FOR NON-ACOUSTIC DETECTION OF SUBMARINES
TOPIC# 196 OFFICE: NSWC IDENT#: 24002

WE BELIEVE IT MAY BE POSSIBLE TO DETECT INTERNAL WAVE REGULARITIES GENERATED BY MOVING SUBMARINES BY USING NON-ACOUSTIC MICROTHERMAL ARRAY MEASUREMENTS SENSITIVE AT THE 0.001 DEG C LEVEL OR BELOW. TYPICALLY OCEANIC MICROTHERMAL TEMPERATURE GRADIENT MEASUREMENTS ARE COMPUTED AS SMALL DIFFERENCES (...) BETWEEN THERMISTOR MEASURED TEMPERATURES T(2) AND T(1) AT TWO DIFFERENT LEVELS ON A TOWED ARRAY. ANY ABSOLUTE ERRORS IN THE MEASUREMENT OF THE LARGE INPUT TEMPERATURE (T2) AND T(1) ARE THUS TREMENDOUSLY MAGNIFIED IN .... WE PROPOSE INSTEAD A COMPLETELY DIFFERENT TECHNIQUE WHICH INTRINSICALLY MEASURES SUCH SMALL ... DIRECTLY RATHER THAN BY SUBTRACTION OF TWO LARGE INDIVIDUAL SEA TEMPERATURE MEASUREMENTS FROM VERTICALLY SEPARATED THERMISTORS. IN THE PHASE I RESEARCH WE WILL DEMONSTRATE BOTH THEORETICALLY AND VIA A LABORATORY PROTOTYPE DEVICE THAT OUR PROPOSED OCEAN MICROTHERMAL SENSOR TECHNIQUE HAS A READABLE RESOLUTION AND STABILITY OF 0.0001 DEG C AND A ABSOLUTE ACCURACY IN ... EXCEEDING 0.0001 DEG C AT A 10 HERTZ OR FASTER DIGITAL SAMPLING RATE.

OPTAGON SYSTEMS INC
5 SIGNAL HILL RD
CHERRY HILL, NJ 08008
CONTRACT NUMBER:
WILLIAM J O'LEARY
TITLE:
STOCK CHURN IN ALLOWANCE LISTS
TOPIC# 52 OFFICE: NAVSUP IDENT#: 22253

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A NAVSEA FY87 EVALUATION OF COSAL ALLOTMENT SHOWS UP TO $60M CHANGE IN COSAL MAY BE UNNECESSARY. THIS STOCK CHURN IS A PRIME TARGET OF THIS STUDY. EXCESS STOCK CHURN REPRESENTS WASTE IN THE FORM OF REDUCED READINESS AND INEFFECTIVE INVESTMENT. STOCK CHURN WILL NEVER BE COMPLETELY ELIMINATED AS LONG AS THERE IS CHANGE TO THE SYSTEMS SUPPORTED. HOWEVER, AN UNDERSTANDING OF THE CAUSAL FACTORS IN STOCK CHURN CAN LEAD TO THE IDENTIFICATION OF UNNECESSARY CHANGE. ELIMINATION OR MINIMIZATION OF CHURN DERIVING FROM THE UNNECESSARY IS THE PATH TO WASTE REDUCTION. SUCCESS OF THIS PROJECT WOULD BE MANIFESTED BY AN INTEGRATED MANAGMENT SYSTEM DIRECTED TO THE ELIMINATION OF THE CAUSES OF UNNECESSARY CHRUN IN THE COSAL GENERATION AND MAINTENANCE PROCESSES. THE SPECIFIC OUTPUT OF THE PROJECT SUPPORTIVE OF THIS OBJECTIVE WOULD INCLUDE; DECISION CRITERIA, STANDARDS, CONTROLS FOR INPUT DATA, DATA QUALITY PROCEDURES, AND MANAGEMENT CHANGE RECOMMENDATIONS.

OPTICS I INC
3625 THOUSAND OAKS BLVD - STE K
WESTLAKE VILLAGE, CA 91362
CONTRACT NUMBER:
ROBERT E FISCHER
TITLE:
A ZOOM LENS FOR FORWARD LOOKING INFRARED SYSTEMS
TOPIC# 213 OFFICE: NADC IDENT#: 24036

ZOOM LENSES, OR LENSES OFFERING A CONTINUOUS VARIATION IN MAGNIFICATION (AND HENCE FIELD OF VIEW), CAN HAVE SIGNIFICANT ADVANTAGES OVER CURRENT SINGLE FIELD OF VIEW SYSTEMS OR EVEN MULTIPLE OR DISCRETE MAGNIFICATIONS FOR FLIR APPLICATIONS. IN THIS PROJECT WE WILL USE THE LATEST COMPUTER LENS DESIGN SOFTWARE AS WELL AS N EXTENSIVE EXPERIENCE BASE IN THE OPTICAL DESIGN OF FLIR TYPE SYSTEMS TO GENERATE A 511 IR ZOOM LENS SUITABLE TO SERVE AS THE TELESCOPE IN A FLIR SYSTEM. ALTHOUGH FROM A FIRST ORDER OPTICS STANDPOINT, THESE SYSTEMS ARE INDEED QUITE FEASIBLE, POTENTIALLY IMAGE DEGRADING FACTORS SUCH AS NARCISSUS, SCAN NOISE, SHADING, AND OTHERS CAN BE SUBSTANTIALLY MORE DIFFICULT TO CONTROL IN A ZOOM CONFIGURATION THAN FOR A SYSTEM WITH MULTIPLE YET DISCRETE FIELDS OF VIEW. OPTICS 1, INC. FULLY UNDERSTANDS THESE ISSUES, AND THEY WILL BE APPROPRIATELY

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TAKEN INTO ACCOUNT IN THE DESIGN. IN ADDITION, USE OF STATE OF THE ART YET APPROPRIATELY MATURE FABRICATION AND PRODUCTION METHODOLOGIES SUCH AS DIAMOND TURNED ASPHERES AND PLASTIC HOUSINGS WILL BE GIVEN STRONG CONSIDERATION AS WARRANTED IN ORDER TO OPTIMIZE PERFORMANCE AND MINIMIZE SIZE, WEIGHT, AND COST.

OPTIMIZATION TECHNOLOGY INC
PO BOX 949
AUBURN, AL 36831
CONTRACT NUMBER:
SANDRA CEPEDA
TITLE:
A FEASIBILITY AND COST/BENEFIT MODEL FOR ASSEMBLER CONVERSION TO ADA
TOPIC# 71 OFFICE: NAVAIR IDENT#: 24506

DOD GUIDELINES DIRECTING THE USE OF ADA AS THE GOVERNMENT STANDARD PROGRAMMING LANGUAGE WILL RESULT IN MANY EXISTING IMPLEMENTATIONS GRADUALLY BEING CONVERTED TO ADA. AS SOFTWARE UPDATES AND HARDWARE ENHANCEMENTS ARE MADE, SINGLE FUNCTIONS MAY BE IMPLEMENTED IN ADA TO EXPLOIT THE LANGUAGE'S MAINTAINABILITY AND PORTABILITY. THIS WILL REQUIRE INTERLANGUAGE INTERFACING, DATA SHARING AND SPECIAL CONSIDERATION OF MEMORY AND THROUGHPUT UTILIZATION. TO EVALUATE NOT ONLY THE IMPACT OF SUCH A TRANSITION BUT ALSO THE VERY FEASIBILITY, OTI IS PROPOSING A FEASIBILITY STUDY AND THE DEVELOPMENT OF A COST/BENEFIT MODEL. ADDITIONALLY, IF THE TRANSITION PROVES FEASIBLE, PHASE II WILL INCLUDE A METHODOLOGY TO CODE AND INTEGRATE NEW ADA MODULES WITH THE EXISTING ENVIRONMENT. THE FEASIBILITY DETERMINATION WILL CONSIDER SUCH FACTORS AS THE CURRENT ASSEMBLER, THE PROPOSED COMPILER, SYSTEM MODULARITY AND MODULE CONNECTIVITY. SPECIAL CONSIDERATIONS INCLUDE THE IMPACT ON MEMORY CONSUMPTION AND THE ABILITY OF THE ADA CODE TO MEET REAL TIME REQUIREMENTS. DUE TO THE RESOURCE EXPENDITURE WHICH WILL BE REQUIRED FOR A PIECEMEAL CONVERSION FROM ASSEMBLY CODE TO ADA, A RELIABLE MEANS OF DETERMINING THE FEASIBILITY AND COST OF SUCH AN EFFORT IS REQUIRED.

OPTRON SYSTEMS INC
3 PRESTON CT
BEDFORD, MA 01730
CONTRACT NUMBER:
DR IRA FARBER
TITLE:
SCANNING ELECTRON-BEAM READOUT ANODE FOR HIGH-SPEED OPTICAL PROCESSING
TOPIC# 194 OFFICE: NSWC IDENT#: 23993

SUBMITTED BY

THE OBJECTIVE OF THIS PHASE I PROGRAM IS TO INVESTIGATE THE FEASIBILITY OF DEVELOPING A NEW CLASS OF IMAGING DETECTORS THAT DIFFER SIGNIFICANTLY FROM THOSE CURRENTLY AVAILABLE IN THAT THE NEW DEVICE EMPLOYS A NOVEL HIGH RESOLUTION MULTI-ANODE FEEDTHROUGH PLATE (FTP) WITH APPROXIMATELY 4000 ANODES/MM(2). THIS HIGH SPEED 2-D DETECTOR ARRAY IS EXPECTED TO BE HIGHLY SENSITIVE, AND OFFERS A FAST SCANNED SERIAL READOUT SUITABLE FOR ELECTRONIC POST-PROCESSING. THIS NEW IMAGING SYSTEM IS CALLED A SCANNING ELECTRON-BEAM READOUT ANODE AND OFFERS THE FOLLOWING FEATURES: (1) OPTICAL DETECTION WITH SIMULTANEOUS PARALLEL-TO-SERIAL CONVERSION, (2) FAST POSITION SENSITIVE DETECTION WITH ANALOG INTENSITY READOUT, (3) ADJUSTABLE, GLOBAL 2-D THRESHOLDING ON RECORDED IMAGES, (4) LONG TERM 2-D SIGNAL STORAGE, AND (5) AN INTEGRATING DETECTION MODE. THE SERA SYSTEM SHOULD BE IDEAL FOR TIME VARIANT IMAGING APPLICATIONS BECAUSE OF ITS INHERENT CAPABILITY OF SIMULTANEOUS IMAGE DETECTION AND READOUT. MOREOVER, THE PROPOSED IMAGING DEVICE SHOULD BE READILY ADAPTABLE TO WIDE RANGE OF PHOTON FLUX LEVELS THROUGH SIMPLE MODIFICATION OF THE OPERATIONAL PARAMETERS. IN THIS REGARD THE SERA DEVICE HAS SEVERAL ADVANTAGES OVER CCD DETECTOR ARRAYS.

ORINCON CORP
3366 N TORREY PINES CT - STE 320
LA JOLLA, CA 92037
CONTRACT NUMBER:
DR DAVID HERRING
TITLE:
ATTRIBUTE-AUGMENTED MULTI-HYPOTHESIS ACOUSTIC DATA FUSION
TOPIC# 215 OFFICE: NUSC IDENT#: 23015

AN IMPORTANT PROBLEM IN TARGET TRACKING AND SURVEILLANCE IS THE TASK OF FUSING ACOUSTIC MEASUREMENT DATA FROM MULTIPLE SENSORS INTO A SINGLE TARGET REPORT. DATA FROM THE DIFFERENT SENSORS SHOULD BE ASSOCIATED SO THAT OBSERVATIONS OF THE SAME TARGET FROM DIFFERENT SENSORS ARE GROUPED TOGETHER, WHILE DISTINCT TARGETS ARE SEPARATED. THE CORRELATION PROCESS USES BOTH GEOPOSITIONAL INFORMATION (RANGE, BEARING, OR GEOLOCATION) AND ATTRIBUTE INFORMATION SUCH AS LINE FREQUENCY, BANDWIDTH, AND STABILITY IN THE CASE OF ACOUSTIC MEASUREMENTS. PREVIOUS WORK ON TACKING ALGORITHMS HAS FOCUSED ON GEO-

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POSITIONAL SCORING, AND LITTLE IMPORTANCE HAS BEEN PAID TO THE USE OF ATTRIBUTE INFORMATION BEYOND SIMPLE GATING TO PREVENT MIXING OF REPORTS AND OBVIOUSLY INCONSISTENT ATTRIBUTES. THE WORK PROPOSED HERE INVOLVES THE DESIGN, TEST, AND EVALUATION OF A SYSTEM TO FUSE ACOUSTIC DATA USING AN EXISTING MULTI-HYPOTHESIS DATA FUSION ALGORITHM INTERFACED WITH A RULE BASED EXPERT SYSTEM TO BE DEVELOPED IN THIS PROJECT IN ORDER TO RESOLVE AMBIGUITIES REMAINING AFTER GATING AND GEOPOSITIONAL SCORING AND TO OTHERWISE ADJUST HYPOTHESIS SCORES BY USING ATTRIBUTE INFORMATION. EMPHASIS WILL BE PLACED ON DEVELOPING EFFICIENT DATA MANAGEMENT TECHNIQUES AND KNOWLEDGE SOURCES TO ENSURE THE ABILITY TO HANDLE LARGE NUMBERS OF CONTACT REPORTS IN A TIMELY MANNER WITHIN AN ENVIRONMENT TYPIFIED, FOR EXAMPLE, BY THE ASWCS OR ACS.

ORINCON CORP
3366 N TORREY PINES CT - #300
LA JOLLA, CA 92037
CONTRACT NUMBER:
WILLIAM D GARRETT
TITLE:
SUBMARINE MAST WAKE REDUCTION
TOPIC# 220 OFFICE: NUSC IDENT#: 23116

A MAST/PERISCOPE MOVING THROUGH THE SEA SURFACE CAUSES SIGNIFICANT DISTRUBANCE TO THE AIR-WATER INTERFACE, ENTRAINS AIR BUBBLES AND CREATES SURFACE BUBBLES AND FOAM (WHITE WATER). THE NATURALLY PRODUCED SURFACE-ACTIVE SUBSTANCES IN SEA WATER STABILIZE THESE BUBBLES AND FOAMS AND RENDER THE MAST-GENERATED WHITE WATER WAKES READILY DETECTABLE BY REMOTE SENSING TECHNIQUES. IT HAS BEEN DEMONSTRATED THAT CERTAIN WATER-INSOLUBLE MONOMOLECULAR ORGANIC FILMS ADDED TO THE SEA SURFACE DAMP SHORT WAVES, RETARD WAVE BREAKING, AND SUPPRESS WHITE WATER FOAMS IN SURFACE VESSEL WAKES WITHIN THE FILM-COVERED AREAS. THE PROPOSED WORK INVOLVES THE DEPLOYMENT OF SELECTED MONOMOLECULAR FILM-FORMING SUBSTANCES FROM A MAST MOVING THROUGH THE SEA SURFACE TO ASCERTAIN THE EXTENT TO WHICH ITS WHITE-WATER WAKE IS REDUCED. WAKE SIGNATURE SUPPRESSION WILL BE DOCUMENTED BY AIRBORNE VISUAL OBSERVATIONS AND PHOTOGRAPHY. THE RESULTS WILL BE ANALYZED TO DETERMINE THE FEASIBILITY OF WHITE-WATER WAKE REDUCTION IN TERMS OF NAVAL OPERATING PROCEDURES, ENVIRONMENTAL PARAMETERS

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SUCH AS SEA STATE, AND ENGINEERING REQUIREMENTS.

ORINCON CORP
3366 N TORREY PINES CT - STE 320
LA JOLLA, CA 92037
CONTRACT NUMBER:
DALE KLAMER
TITLE:
CONTACT MANAGEMENT OPERATOR INTERFACE
TOPIC# 223 OFFICE: NUSC IDENT#: 23128

THE GENERAL PROBLEM ADDRESSED IN CONTACT MANAGEMENT IS THE ESTIMATION OF THE STATES OF MULTIPLE TARGETS IN A MULTIPLE SENSOR ENVIRONMENT. THE CHARACTERISTICS OF THE PROBLEM PLACE THE REQUIREMENTS THAT THE CONTACT MANAGEMENT ALGORITHM MUST BE ROBUST AND HIGHLY AUTOMATED, BUT STILL ALLOW THE OPERATOR CONTROL. A NEW GENERAL APPROACH TO THE CONTACT MANAGEMENT PROBLEM THAT IS CURRENTLY UNDER DEVELOPMENT IS MULTIPLE HYPOTHESIS CONTACT MANAGEMENT ALGORITHMS (MHCMA). MHCMA APPROACHES FOR CONTACT MANAGEMENT, SUCH AS ORCA DEVELOPED BY ORINCON, FORM A GLOBAL PARTITION OF THE DATA INTO TRACKS. EACH PARTITION IS AN ALTERNATIVE VIEW OF THE POSSIBLE TARGETS THAT ARE PRESENT. THE FUNDAMENTAL ISSUE THAT REMAINS TO BE ADDRESSED BEFORE MHCMA APPROACHES CAN HAVE WIDESPREAD APPLICATION IS THE ADDITION OF A SIMPLE OPERATOR INTERFACE THAT PROVIDES INTERACTION AND CONTROL. THE PRIMARY TECHNICAL OBJECTIVES IS TO DEVELOP A PROTOTYPE SYSTEM THAT PROVIDES THE FOLLOWING CAPABILITIES FOR AN MHCMA APPROACH: (1) SCENE PRESENTATION TO THE OPERATOR THAT IS TRACK ORIENTED AS OPPOSED TO CURRENT TECHNIQUES THAT PROVIDE A GLOBAL HYPOTHESIS; AND (3) AS A RESULT OF OPERATOR SELECTION, AUTOMATED HYPOTHESIS MODIFICATION AND RESCORING OF RESULTING HYPOTHESES.

ORINCON CORP
3366 N TORREY PINES CT - STE 320
LA JOLLA, CA 92037
CONTRACT NUMBER:
DR J A PRESLEY JR
TITLE:
IMPROVED ANTI-SUBMARINE WARFARE DISPLAY
TOPIC# 243 OFFICE: NOSC IDENT#: 24164

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CURRENT SONAR TIME-BEARING DISPLAYS SHOW A SIGNIFICANT DETECTION PERFORMANCE DEGRADATION ATTRIBUTED TO THEIR NORMALIZATION PROCESSING. THIS DEGRADATION IS CAUSED BY THE INABILITY OF NORMALIZATION ALGORITHMS IN CURRENT OPERATIONAL SONAR SYSTEMS TO SIMULTANEOUSLY ACHIEVE NEARLY OPTIMAL NORMALIZATION ROBUSTNESS AND DETECTION SENSITIVITY. THIS DEGRADATION IS AN INHERENT FEATURE OF THE NORMALIZATION ALGORITHM STRUCTURES EXISTENT IN CURRENT OPERATIONAL SONAR SYSTEMS. FURTHERMORE, THIS DEGRADATION IS STEADILY WORSENING IN OPERATIONAL SONAR SYSTEMS BECAUSE OF THE RESPONSE OF THE SONAR SYSTEM DESIGNER TO THE CONTINUOUSLY QUIETENING THREAT. THIS RESPONSE IS TO BUILD SONARS WITH INCREASED ARRAY GAIN, WHICH THEREFORE "SEE" MORE INTERFERING TARGETS. IN MANY SCENARIOS, THE DETECTION PERFORMANCE INCREASE PROVIDED BY THE INCREASED ARRAY GAIN IS LARGELY OFFSET BY THE DEGRADATION CAUSED BY POOR NORMALIZER PERFORMANCE. THE PRIMARY OBJECTIVE OF THE PHASE I EFFORT IS TO DEMONSTRATE THE NEW NORMALIZATION ALGORITHMS CAN PROVIDE SIGNIFICANT DETECTION PERFORMANCE IMPROVEMENTS FOR SONAR TIME-BEARING DISPLAY APPLICATIONS ON A VARIETY OF OPERATIONALLY REALISTIC NAVY SUPPLIED AND CONTRACTOR GENERATED REAL AND SIMULATED TEST DATA CASES. TEST CANDIDATES WILL BE CHOSEN FROM THE FAMILIES OF CENSORED MEAN-LEVEL DETECTOR (CMLD) AND SPLIT-AVERAGE-EXCLUDE-AVERAGE NORMALIZERS BECAUSE OF THEIR EXTENSIVELY PROVEN ROBUST DETECTION PERFORMANCE IN SPECTRAGRAM AND RADAR DISPLAY APPLICATIONS.

ORINCON CORP
3366 N TORREY PINES CT - STE 300
LA JOLLA, CA 92037
CONTRACT NUMBER:
GERALD C MOONS
TITLE:
EXPERT SYSTEM FOR TACTICAL PLATFORM RESOURCE ALLOCATION
TOPIC# 110 OFFICE: NAVSEA IDENT#: 24883

THE EXPERT SYSTEM DEVELOPED UNDER THIS EFFORT WILL DEMONSTRATE THE CAPABILITY TO USE TACTICAL DECISION, AIDS, EXPERT RULES, STATIC AND REAL TIME ENVIRONMENTAL DATA, ACOUSTIC MODELS, AND A MULTI-TARGET TRACKER TO DETERMINE OPTIMUM UNDER SEA WARFARE TACTICS FOR SENSOR PLACEMENT AND ORIENTATION. CRITICAL ELEMENTS OF MISSION PLANNING FOR

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CONTACT ACQUISITION, TRACKING, AND ORDINANCE DELIVERY AGAINST ALL THREAT SCENARIOS MUST BE SUPPORTED. SUFFICIENT FLEXIBILITY WILL BE PROVIDED FOR MISSION PLANNERS TO DEVELOP RESOURCE ALLOCATION PLANS, DESIGN TACTICS, AND VALIDATE SENSOR DISTRIBUTION PLANS. THE OBJECTIVES OF THE PHASE I PORTION OF THIS PROJECT ARE TO DEVELOP A DECISION TREE OF TACTICAL RESOURCE ALLOCTION RULES USED BY ON SCENE COMMANDERS; USE THE DECISION TREE IN CONJUNCTION WITH TACTICAL DECISION AIDS, ACOUSTIC PERFORMANCE PREDICTIONS, AND A MULTI-TARGET TRACKER TO DEVELOP AN EXPERT SYSTEM SIMULATION FOR THE ALLOCATION OF TACTICAL ASSETS; AND TO EVALUATE AND MODIFY THE SIMULAITON BASED ON COMMENTS PROVIDED BY EXPERT TACTICAL PLANNERS.

ORTEL CORP
2015 W CHESTNUT ST
ALHAMBRA, CA 91803
CONTRACT NUMBER:
DR HENRY BLAUVELT
TITLE:
IMPROVED MICROWAVE PERFORMANCE OF LASER DIODES BY THE USE OF OPTICAL FACET COATING TECHNIQUES
TOPIC# 45 OFFICE: SPAWAR IDENT#: 24433

OPTICAL FIBER HAS OUTSTANDING PROPERTIES FOR USE IN MICROWAVE SIGNAL TRANSMISSION. IN THIS PROPOSAL, TECHNIQUES ARE DESCRIBED FOR ENHANCING THE MICROWAVE PERFORMANCE OF LASER DIODES BY FACET COATING. FACET COATING TECHNIQUES ARE PROPOSED TO INCREASE THE BANDWIDTH AND TO NARROW THE SPECTRAL WIDTH OF LASER DIODES.

PACIFIC R&D INC
1612 W GLENOAKS BLVD
GLENDALE, CA 91201
CONTRACT NUMBER:
RICHARD W D BOOTH
TITLE:
PROPOSAL FOR A PULSE CODE MODULATION TELEMETRY TRANSMITTER
TOPIC# 227 OFFICE: PMTC IDENT#: 24070

THIS PROPOSAL DISCUSSES THE DESIGN OF A LOW COST, COMPACT, AND

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EASILY CONSTRUCTED TELEMETRY TRANSMITTER THAT TAKES ADVANTAGE OF THE REQUIREMENT THAT ONLY DIGITAL DATA IS TO BE TRANSMITTED. THE TRANSMITTER USES FREQUENCY SHIFT KEYING OR FSK. DIGITAL SYNTHESIS TECHNIQUES ARE USED TO GENERATE THE OUTPUT SIGNAL FREQUENCY. THIS USES LOW COST AND RELIABLE DIGITAL INTEGRATED CIRCUITS. THE USE OF DIGITAL SYNTHESIS RESULTS IN A DESIGN THAT DOES NOT USE ANY TUNED CIRCUITS AND AS A CONSEQUENCE IS SIMPLE, EASILY ADJUSTED, VIBRATION AND ABUSE RESISTANT AND LOW COST.

PASKOWITZ ASSOCS
1323 LANCIA DR
McLEAN, VA 22102
CONTRACT NUMBER:
SID PASKOWITZ
TITLE:
SINGLE DEMAND REPORTING SYSTEM
TOPIC# 56 OFFICE: NAVSUP IDENT#: 22297

CURRENT EFFORTS TO CONSOLIDATE DEMAND REPORTING INTO A SINGLE SYSTEM FOCUS PRIMARILY ON SUPPLY DATA (I.E., THE DATA NEEDED TO IDENTIFY THE PART BEING REQUESTED). THE OBJECTIVES OF THE PROPOSED RESEARCH EFFORTS ARE TO DETERMINE THE FEASIBILITY OF FOCUSING ON THE TOTAL MAINTENANCE REQUIREMENT FOR LOGISTIC SUPPORT INCLUDING SUPPLY DATA, AND TO IDENTIFY THE NECESSARY DATA ELEMENTS TO BE COMMUNICATED. THE NETWORK COMMUNICATIONS SYSTEM WITH INTELLIGENT GATEWAYS BEING DEVELOPED BY THE OFFICE OF THE SECRETARY OF DEFENSE (OSD) MAY PERMIT DATA NEEDED BY STOCK POINTS OR INVENTORY CONTROL POINTS TO BE STRIPPED FROM THE TOTAL DATA PACKET WHILE OTHER ASSOCIATED DATA CAN BE TRANSMITTED TO OPERATIONAL COMMANDERS, COMMERICAL AND GOVERNMENT ENGINEERING ACTIVITIES, HARDWARE PROGRAM MANAGEMENT ACTIVITIES, ETC. THE PRIMARY BENEFIT FROM THE PROPOSED EFFORT WILL BE THAT NOT ONLY WILL SUPPLY DATA BE CONSOLIDATED AND MORE COMPLETE, BUT THE MAINTENANCE REQUIREMENT CAN ALSO BE VALIDATED BY MAINTENANCE ENGINEERING AND DESIGN ORGANIZATIONS TO ASSURE THE CORRECT ITEM(S) OF SUPPLY ARE BEING REQUESTED AND INCLUDED AS DEMAND DATA.

PASKOWITZ ASSOCS
1323 LANCIA DR
McLEAN, VA 22102
CONTRACT NUMBER:
SID PASKOWITZ
TITLE:
PROVISIONING/SUPPLY SUPPORT UNDER CALS
TOPIC# 127 OFFICE: NAVSEA IDENT#: 25001

SUBMITTED BY

ADVANCEMENTS IN MICROCOMPUTERS PERMIT A LINKAGE BETWEEN ENGINEERS AND SUPPLY SUPPORT PROFESSIONALS. THE SELECTION OF PARTS WHICH SATISFY HARDWARE SYSTEM PERFORMANCE REQUIREMENTS CAN BE INFLUENCED BY NAVY SUPPLY SUPPORT PROFESSIONALS WHO MUST ASSURE HARDWARE SYSTEM READINESS BASED ON SUPPLY SUPPORT. IMPROVEMENTS CAN BE MADE IN THE ACCURACY AND COMPLETENESS OF CATALOGING DATA. INCREASED COMPETITION CAN BE DEVELOPED FOR UNREASONABLY PRICED OR LONG LEADTIME PARTS. THE MISSING LINK IS AN AUTOMATED MANAGEMENT SYSTEM WHICH WILL PROVIDE: A VEHICLE FOR THE GOVERNMENT TO IDENTIFY ITS DATA AND MATERIAL REQUIREMENTS TO INDUSTRY IN A MEDIUM THAT WILL BE SUPPORTIVE AND UNOBTRUSIVE IN THE WAY INDUSTRY DOES ITS BUSINESS; A DATA COMMUNICATIONS AND PROTOCOL VEHICLE BETWEEN GOVERNMENT AND INDUSTRY; AND A LOW-COST, COST-SAVINGS, OR PROFIT ENHANCEMENT SYSTEM FOR IMPLEMENTATION BY INDUSTRY (I.E., A CAPABILITY WHICH WILL SERVE BOTH GOVERNMENT'S AND INDUSTRY'S BEST INTEREST). PHASE I WILL DEVELOP THE PROPOSAL SYSTEM DESIGN FOR A MICROCOMPUTER-BASED LINK BETWEEN ENGINEERS AND SUPPLY SUPPORT PROFESSIONALS. PHASE II WILL PROVIDE AN OPERATING, TESTED MICROCOMPUTER SYSTEM FOR AUTOMATED DEVELOPMENT AND DELIVERY OF PROVISIONING AND SUPPLY SUPPORT DATA.

PERFECT VIEW INC
532 PYLON DR
RALEIGH, NC 27606
CONTRACT NUMBER:
DR A J ATTAR
TITLE:
COATED FIBER OPTIC ARRAYS SENSORS FOR TOXIC GASES
TOPIC# 85 OFFICE: NAVSEA IDENT#: 24547

SENSING OF THE PRESENCE OF WARFARE GASES AND OF ENVIRONMENTAL GASES IS CRITICAL TO MAINTAINING A PROPER WORKING ENVIRONMENT ON SHIPBOARDS AND IN SUBMARINES. PERFECT VIEW INC. AND THE PRINCIPAL INVESTIGATOR HAVE DEVELOPED FOR THE U.S. AIR FORCE OVER THE LAST FEW YEARS CHEMICAL COATINGS THAT CHANGE THEIR COLOR IN A QUANTITATIVE MANNER WHEN EXPOSED TO WARFARE GASES. SIMILAR CHROMOPHORIC MIXTURES HAVE ALSO BEEN DEVELOPED FOR OTHER GASES, E.G., WATER, AROMATIC AMINES, HYDROGEN SULFIDES, ETC. THE COATINGS DEVELOPED USE A NOVEL PROPRIETARY CATALYTIC CHEMISTRY (PATENT PENDING) THAT ALLOWS THE

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DETECTION OF SUB-LETHAL CONCENTRATIONS OF GASES LIKE MUSTARDS (MG) AND NERVE GASES (NG) AT AMBIENT TEMPERATURE IN A TIMESCALE OF THE ORDER OF 20-40 SECONDS WITH A VERY LOW INTERFERENCE, I.E., WITH A VERY HIGH SELECTIVITY. THE MAIN OBJECTIVE OF THE PROPOSED WORK IS TO EXAMINE THE FEASIBILITY OF THE USE OF INTERNALLY-COMPENSATED COATED FIBER OPTIC PAIRS AS MICROSENSORS FOR CONVENTIONAL GASES LIKE CO2, CO, H2O, H2S, ETC., BUT ALSO FOR GASES LIKE MG AND NG USING IRREVERSIBLE BUT VERY SENSITIVE CHROMOPHORIC REACTIONS. BY THE USE OF OUR SPECIFIC KNOW-HOW AND CATALYSTS, WE HAVE PROVED THAT SELECTIVITY MAY BE ACHIEVED BY THE DESIGN OF THE COATING ALONE. THEREFORE, THE UNIQUE FORM OF GAS DETECTOR PROPOSED WILL REQUIRE NO PRISMS, GRATES OR OTHER EXPENSIVE OPTICAL DEVICES THAT REQUIRE PRECISION ALIGNMENT. THUS, THE PROPOSED DETECTOR HAS THE POTENTIAL OF BEING EXTREMELY LOW-COST AS WELL AS ACCURATE AND SELECTIVE. MOREOVER, THE DETECTOR LENDS ITSELF EASILY TO COMPUTERIZED CENTRAL CONTROL AND TO ROUTINE AS WELL AS EMERGENCY WARNING USE. MOST OF THE OPTICS AND ELECTRONICS NEEDED FOR THE DETECTOR CAN BE CONSIDERED KNOWN AND ESTABLISHED TECHNOLOGY. OUR OBJECTIVE IN PHASE I IS TO EXPAND OUR KNOWLEDGE OF COATINGS AND TO INTEGRATE THEM ONTO THE PROPER OPTIC FIBERS AND ELECTRONICS TO ACHIEVE THE DESIRED DETECTOR PERFORMANCE.

PHOENIX DIGITAL CORP
2315 - N 35TH AVE
PHOENIX, AZ 85009
CONTRACT NUMBER: N68335-89-C-0089
RONALD A BROWN
TITLE:
FIBER OPTIC NETWORK FOR CARRIER ARRESTING GEAR C3 FUNCTIONS
TOPIC# 225 OFFICE: NAEC IDENT#: 24056

REDUNDANCY AND FAULT TOLERANCE ARE CRITICAL REQUIREMENTS IN FIBER OPTIC NETWORKS USED IN DISTRIBUTED CONTROL SYSTEMS. ARCHITECTURAL DESIGN SHORTCOMINGS IN PROGRAMMABLE CONTROL HARDWARE AND SOFTWARE AREAS COULD ADVERSELY IMPACT THE VIABILITY OF PROGRAMMABLE CONTROLLERS IN NAVAL SHIPBOARD USE, DUE TO MISSION SPECIFIC REQUIREMENTS AND ENVIRONMENTAL FACTORS. THIS PROPOSAL PUTS FORTH AN ADVANCED GENERAL PURPOSE, PROGRAMMABLE CONTROLLER PLATFORM FOR USE IN PROVIDING CARRIER ARRESTING GEAR CONTROL. THIS CONTROL PLATFORM WILL PROVIDE

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THE SPECIALIZED TECHNOLOGIES REQUIRED FOR NAVAL SHIPBOARD USE, NOT FOUND IN CONVENTIONAL PROGRAMMABLE CONTROLLERS. THESE TECHNOLOGIES WILL INCLUDE SPECIAL PURPOSE REAL TIME CONTROL MODULES AND AN INTEGRAL FIBER OPTIC FAULT TOLERANT COMMUNICATION NETWORK BASED UPON THE EMERGING U.S. NAVY SAFENET COMMUNICATION STANDARD. INTEGRAL FIBER OPTIC SENSORS WILL ALSO BE DEMONSTRATED. COMMUNICATION CAPABILITY WILL ENABLE LINKAGE OF SIMILAR AND DISSIMILAR PROGRAMMABLE CONTROLLERS VIA THE FIBER OPTIC NETWORK. OTHER STUDY OBJECTIVES WILL BE RESEARCHED AND PRESENTED IN THE FINAL REPORT. AN INTERIM PROOF OF CONCEPT DEMONSTRATION OF THE DEVELOPMENT PLATFORM WILL BE CONDUCTED IN PHOENIX, ARIZONA 90 DAYS AFTER START OF WORK, FOR APPROPRIATE NAVAL AIR ENGINEERING PERSONNEL.

PHOTO-METRICS INC
4 ARROW DR
WOBURN, MA 01801
CONTRACT NUMBER:
RANDALL B SLUDER
TITLE:
TRACKING CHARGED PARTICLE BEAMS BY INFRARED OPTICAL TRIANGULATION
TOPIC# 142 OFFICE: NSWC IDENT#: 23617

A PROCEDURE FOR LOCATING WITH HIGH PRECISION THE TRACK OF WEAPONIZED ELECTRON BEAMS BY REMOTE PASSIVE OPTICAL IMAGING OF INFRARED EMISSIONS EXCITED BY THE ENERGETIC PARTICLES IS PROPOSED. PROVEN VECTOR METHODS WOULD BE APPLIED TO LOCATE THE BEAM'S PATH THROUGH THE ATMOSPHERE IN 3 DIMENSIONS FROM THE 2-DIMENSIONAL PROJECTIONS OF ITS RADIATION PATTERN TO SHIPBOARD IMAGING ARRAYS. THE ITERATIVE TRIANGULATION ALGORITHMS REQUIRED ARE TO BE IMPLEMENTED IN A COMBINATION OF DEDICATED SOFTWARE AND HARDWARE TO PROVIDE REAL TIME FEEDBACK OF THE BEAM'S SPATIAL STRUCTURE AND AXIS POSITION TO THE FIRE CONTROL SYSTEM.

PHOTON RESEARCH ASSOCS INC
3377 N TORREY PINES CT - #300
LA JOLLA, CA 92037
CONTRACT NUMBER:
E J MARTTILA
TITLE:
RAM INFRARED TARGET DETECTOR
TOPIC# 95 OFFICE: NAVSEA IDENT#: 24753

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THIS PROPOSAL SUGGESTS UTILIZATION OF A PASSIVE, INFRARED SENSOR DESIGN AS THE ALTERNATE FUZING TARGET DETECTOR FOR THE RAM MISSILE. THE FUNDAMENTAL APPROACH WILL RELY UPON THE USE OF INFRARED ABSORPTION BAND PHENOMENOLOGY TO DRIVE THE INFRARED (IR) SENSOR CONCEPT DESIGN. THE PHASE I EFFORT WILL PERFORM 1) ANALYSES, 2) TRADE STUDIES, 3) SIMULATIONS, AND 4) REQUIREMENTS DEFINITION OF THE INFRARED SENSOR CONCEPT. THIS WILL RESULT IN A DESIGN BEST CAPABLE OF DETECTING LOW AND REVERSE CONTRAST TARGEST AND, AT THE SAME TIME OF REJECTING FALSE TARGETS AND/OR CLUTTER SOURCES SUCH AS ENGINE PLUMES, IR DECOYS, THE SUN AND BACKGROUND CLUTTER. WE PROPOSE TO PERFORM A SYSTEM LEVEL FUZE REQUIRMENTS REQUIREMENTS REVIEW TO OBTAIN BOUNDING CONSTRAINTS ON MISSION PHENOMENOLOGY. PRA WILL THEN PERFORM PHENOMENOLOGY ANALYSES WHICH WILL CONSIST OF SIMULATIONS TO DEFINE SPECTRAL BANDS FOR WHICH TARGET TRANSMISSION IS IS SIMULTANEOUSLY MINIMIZED. OUR ANALYSIS SHALL RESULT IN PHASE II CONCEPTUAL DESIGN REQUIREMENTS FOR THE IR SENSOR AND PROCESSOR.

PHYSICAL OPTICS CORP
2545 - W 237TH ST
TORRANCE, CA 90505
CONTRACT NUMBER:
DR TOMASZ JANNSON
TITLE:
TRANSREFLECTIVE LIQUID CRYSTAL/PLASTIC FIBER OPTIC MODULES
TOPIC# 242 OFFICE: NOSC IDENT#: 24162

THE GOAL OF THIS PROGRAM IS TO FILL THE NEED FOR LOWCOST, HIGH RESOLUTION FLAT PANEL DISPLAY MODULES FOR TACTICAL APPLICATIONS BY DEVELOPING HIGH SPEED (MILLISECOND TO MICROSECOND), HIGH RESOLUTION (250 LINE PAIRS PER mm), AND HIGH CONTRAST (100:1 - 1500:1) LIQUID CRYSTAL SPATIAL LIGHT MODULATORS (LCSLM) WITH MULTI-COLOR TUNABILITY. THE LCSLM's CAN BE MOUNTED ON POC'S PROPRIETARY FIBER OPTIC MATRIX COLLIMATORS TO FORM RUGGED PROGRAMMABLE FLAT-PANEL TRANSREFLECTIVE DISPLAY MODULES. THIS DISPLAY IS NON-ABSORPTIVE AND TUNABLE FROM THE UV (.3 um) TO THE INFRARED (3 um). THIS SYSTEM USES LOW COST, COMMERCIALLY DRIVEN OPTICAL COMPONENTS SUITABLE FOR MASS PRODUCTION, WHICH CAN BE EASILY INTEGRATED TO FORM LARGE SIZE DISPLAYS. IN ADDITION, THE DISPLAY MODULES MAY BE BLACK AND WHITE, OR MULTICOLOR.

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THE MULTICOLOR DISPLAYS USE A NOVEL, POC PROPRIETARY TECHNIQUE WHICH ALLOWS THE POSSIBILITY OF WAVELENGTH MULTIPLEXING AND DEMULTIPLEXING INFORMATION. THIS NEW DEGREE OF FREEDOM INCREASES THE AMOUNT OF INFORMATION THAT CAN BE MONITORED OR TRANSMITTED BY 2-3 ORDERS OF MAGNITUDE.

PHYSICAL OPTICS CORP
2545 - W 237TH ST
TORRANCE, CA 90505
CONTRACT NUMBER:
DR WILLIAM PHILLIPS
TITLE:
HOLOGRAPHIC REAL IMAGE TARGETS
TOPIC# 31 OFFICE: MARCORPS IDENT#: 24320

IN THIS PROGRAM PHYSICAL OPTICS CORPORATION (POC) PROPOSES A NEW APPROACH TO HOLOGRAPHIC DECOY FABRICATION BY EMPLOYING ITS HIGH EFFICIENCY HOLOGRAPHIC FOIL TECHNOLOGY BASED ON VOLUME BRAGG HOLOGRAPHY TO PRODUCE HOLOGRAPHIC DECOYS OF EXCEPTIONAL CHARACTERISTICS SUCH AS BRIGHTNESS, LARGE SIZE AND WIDE ANGULAR VISIBILITY. THE MOST ATTRACTIVE APPLICATIONS OF HOLOGRAPHY IN FALSE TARGET SIMULATION TO BE INVESTIGATED IN THIS PROJECT RESIDE IN REAL IMAGE HOLOGRAPHY DECOYS WHERE THE 3D IMAGES OF MILITARY OBJECTS CAN BE PROJECTED IN SPACE SIMULATING THE REAL OBJECT. SUCH 3D DECOYS CAN NOT BE DISTINGUISHED FROM REAL OBJECTS BY ANY OPTICAL SENSORS. WITH OUR ADVANCED HOLOGRAPHIC TECHNIQUES WE CAN RECORD THE INFORMATION IN THE HOLOGRAPHIC IMAGE, HAVE IT RECONSTRUCTED BY WHITE LIGHT ILLUMINATION WHILE PRESERVING THE REAL SHAPE AND COLORS OF THE OBJECT.

PLANNING SYSTEMS INC
7925 WESTPARK DR
McLEAN, VA 22102
CONTRACT NUMBER:
EUGENE MOLINELLI
TITLE:
TACTICAL OCEAN ACOUSTIC ENVIRONMENTS
TOPIC# 6 OFFICE: ONR IDENT#: 22364

SUBMITTED BY

AN EXAMINATION OF NEURAL NETWORK PROCESSING AS AN ALTERNATIVE TO HEAVY USE OF AN EXPERT OCEANOGRAPHER IN ORDER TO DETERMINE GULF STREAM POSITION IS WARRANTED DUE TO RECENT ADVANCE IN NEURAL NETWORK THEORY. THIS PROPOSAL PRESENTS AN INNOVATIVE APPROACH TO THE USE OF THESE NEW IDEAS AS THEY APPLY TO THE ANALYSIS OF SATELLITE DATA. THE NEURAL NETWORK WILL BE USED IN CONJUNCTION WITH EXISTING COMPLEX EMPIRICAL ORTHOGONAL FUNCTION (CEOF) SOFTWARE IN ORDER TO PROVIDE A SYSTEM CAPABLE OF PRODUCING A USEFUL GULF STREAM POSITION DIRECTLY FROM SATELLITE IMAGERY WITHOUT OPERATOR ASSISTANCE. THE ADVANTAGES TO THIS APPROACH INCLUDE SPEED OF PROCESSING AND DECREASED RELIANCE ON EXPERT ANALYSIS OF SATELLITE DATA AND HOLD OPEN THE POSSIBILITY OF SHIPBOARD USE OF SUCH A SYSTEM. THE PROPOSED EFFORT WOULD DETERMINE THE VIABILITY OF SUCH A SCHEME AND ANALYZE THE CRUCIAL FACTORS NECESSARY FOR LARGE-SCALE DEVELOPMENT SUCH AS THE NUMBER OF NODES NEEDED AND THE LEARNING RULE FOR THE NETWORK. THESE CONSIDERATIONS DEMAND THE INVOLVEMENT OF EXPERIENCED USERS OF AVHRR SATELLITE DATA AS WELL AS SCIENTISTS COGNIZANT OF NEURAL NETWORK THEORY AND APPLICATIONS.

PLANNING SYSTEMS INC
7925 WESTPARK DR
McLEAN, VA 22102
CONTRACT NUMBER:
DAVID WOOLLEN
TITLE:
INTEGRATED UNDERSEA SURVEILLANCE EVENT DATA LANGUAGE
TOPIC# 34 OFFICE: SPAWAR IDENT#: 24352

THE EVOLUTION OF THREAT SIGNATURE CHARACTERISTICS AND THE INTRODUCTION OF NEW EQUIPMENT INTO THE INTEGRATED UNDERSEA SURVEILLANCE SYSTEM (IUSS) HAVE CREATED A NEED FOR A MORE CAPABLE EVENT REPORTING LANGUAGE THAN THE CURRENT ABBREVIATED TRACKING AND REPORTING FORM (ATARF). THE WORK PROPOSED HERE WILL ESTABLISH BOUNDS ON THE SIZE AND COMPLEXITY OF THE NEEDED EVENT LANGUAGE AND WILL DEFINE A SUBSET OF THIS LANGUAGE THROUGH THE USE OF A CONTEXT-FREE GRAMMAR. A COMPREHENSIVE LANGUAGE DESIGNED IN THIS WAY CAN BE USED AS AN INTERFACE BETWEEN IUSS SOFTWARE COMPONENTS AND BETWEEN ANALYSTS.

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PLANNING SYSTEMS INC
7925 WESTPARK DR
McLEAN, VA 22102
CONTRACT NUMBER:
DR ALAN FRIEDMAN
TITLE:
LOW FREQUENCY TRANSIENT DETECTION/SOURCE LOCALIZATION PROCESSOR FOR SONOBUOYS
TOPIC# 61 OFFICE: NAVAIR IDENT#: 24456

DEVELOPMENT OF A CAPABILITY FOR EXPLOITING TRANSIENTS EMITTED BY A SUBMARINE DURING AN AIRBORNE ASW SEARCH OPERATION WILL REQUIRE MULTIPLE SONOBUOY PROCESSING TECHNIQUES WHICH CAN: OPERATE IN PARALLEL WITH NORMAL NARROWBAND/BROADBAND PROCESSING; PROVIDE SOME DEGREE OF AUTOMATION FOR TRANSIENT DETECTION; AND INVOLVE PROCESSING HARDWARE COMMENSURATE WITH AIRCRAFT LIMITATIONS. WITH MANY BUOY CHANNELS TO PROCESS SIMULTANEOUSLY, AND WITH A BORAD RANGE OF TRANSIENTS TO SEARCH FOR, STANDARD TRANSIENT PROCESSING APPROACHES WITH RAPIDLY SATURATED THE ON-BOARD RESOURCES. THE SEISMIC EXPLORATION CLASS OF TECHNIQUES CALLED MIGRATION ARE SHOWN IN THIS PROPOSAL TO PROVIDE A CORRECT CONCEPTUAL FRAMEWORK FOR THE MULTI-CHANNEL PROBLEM WITH UNKNOWN TRANSIENT SIGNAL CHARACTERISTICS. IT IS PROPOSED TO INVESTIGATE A PROCESSING APPROACH BASED ON MIGRATION IN SEVERAL SUCCINCT STEPS: REVIEWING MIGRATION ALGORITHMS AND CHARACTERISTICS, PARTICULARLY FK-BASED APPROACHES; DEFINING SIGNAL AND SONOBUOY FIELD PARAMETERS FROM AVAILABLE DATA BASES ON AIRBORNE ASW OPERATIONS AND U.S. SUBMARINE TRANSIENT PROPERTIES; CONDUCTING SIMULATIONS OF BASIC MIGRATION PROCESS TO UNDERSTAND GEOMETRY SENSITIVITIES AND BASELINE PERFORMANCE, ANALYZING OTHER SEISMIC TECHNIQUES FOR PRE-MIGRATION SIGNAL CONDITIONING; AND ANALYZING PROCESSOR SIZING FOR A CONCEPTUAL MIGRATION SYSTEM. THE FINAL TASK WILL CONSIST OF DEFINING AN APPROACH TO DETAIL FEASIBILITY DEMONSTRATION VIA A LABORATORY TEST BED IN PHASE II.

PLANNING SYSTEMS INC
7925 WESTPARK DR
McLEAN, VA 22102
CONTRACT NUMBER:
RICHARD D BURGETT
TITLE:
APPLICATION OF IMAGE ENHANCEMENT ALGORITHMS AND TECHNIQUES TO MINEHUNTING SONAR
TOPIC# 109 OFFICE: NAVSEA IDENT#: 24879

SUBMITTED BY

THERE HAVE BEEN MAJOR ADVANCES IN DIGITAL SIGNAL PROCESSING, FROM BOTH THE HARDWARE AND SOFTWARE STANDPOINT, THAT ALLOW FOR THE IMPLEMENTATION OF SOPHISTICATED ALGORITHMS IN SMALL PACKAGES TO DO IMAGE ENHANCEMENT. THE MCM COMMUNITY HAS NOT MADE FULL USE OF THE DIGITAL SIGNAL PROCESSING TOOLS THAT HAVE BEEN DEVELOPED FOR IMAGE ENHANCEMENT AND ANALYSIS, PARTICULARLY WITH RESPECT TO MINEHUNTING SONAR IMAGES THAT ARE DISPLAYED TO THE OPERATOR. IT IS EXPECTED THAT MUCH COULD BE DONE TO INCREASE DISPLAYED IMAGE RESOLUTION, ENHANCE THE VISUAL DIFFERENTIATION BETWEEN TARGET AND BACKGROUND, ENHANCE THE SHAPE OF THE TARGET FOR IMAGE FORMATION AND OPERATOR CLASSIFICATION OF THE TARGET. PSI WILL DETERMINE, FROM A THOROUGH INTERDISCIPLINARY REVIEW OF AVAILABLE DIGITAL SIGNAL PROCESSING AND IMAGE ENHANCEMENT TECHNIQUE, THOSE THAT ARE IDEALLY SUITED FOR USE ON EXISTING AND FUTURE MINEHUNTING SONAR SYSTEMS. TECHNICAL SPECIFICATION WILL BE PREPARED FROM THE CANDIDATE TECHNIQUES FOR A PROTOTYPE SYSTEM.

POLYTRONNIX INC
805 ALPHA DE
RICHARDSON, TX 75081
CONTRACT NUMBER:
JACOB W LIN
TITLE:
HEADS-UP DISPLAY FOR SHIPBOARD USE
TOPIC# 79 OFFICE: NAVSEA IDENT#: 24674

A NEW TYPE OF LIQUID CRYSTAL MATERIAL, POLYMER DISPERSED LIQUID CRYSTALS (PDLC), WILL BE DEVELOPED FOR USE AS A HEADS-UP DISPLAY. THIS PROPOSAL IS CENTERED ON RECENT DRAMATIC ADVANCES IN LIQUID CRYSTAL TECHNOLOGY DEMONSTRATED BY THESE PDLC UNITS. THESE NEW MATERIALS EXHIBIT EXCELLENT TRANSMISSION (>90%) IN THE POSITIVE CLEAR MODE, ALONG WITH RAPID RESPONSE TIME (~1 MILLISECOND) AND LOW VOLTAGE (~30V) AND POWER (300 nW) REQUIREMENTS. ADDITIONALLY, THESE DEVICES CLEARLY HAVE THE POTENTIAL FOR FABRICATION AS LARGE AREA (PERHAPS UP TO 1 METER X 1 METER) DISPLAYS INCLUDING USE ON CURVILINEAR SURFACES. THE PHASE I WORK EFFORT WILL INVOLVE CONSTRUCTION OF PROTOTYPE DISPLAYS AND WILL INCLUDE QUANTITATIVE MEASUREMENTS OF DISPLAY CHARACTERISTICS (I.E., % TRANSMISSION, CONTRAST AND BRIGHTNESS, RESPONSE TIME AND ELECTRICAL REQUIREMENTS).

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THE PHASE I WORK EFFORT WILL CONCLUDE WITH SUBMISSION OF WORKING HEADS-UP DISPLAY UNITS FOR EVALUATION BY NAVY PERSONNEL. OUR (POLYTRONIX) ABILITY TO RESPOND TO THIS INITIATIVE AND PROVIDE THE NECESSARY RESULTS IN ONLY A SIX-MONTH PERIOD IS PREDICATED ON OUR CURRENT RESEARCH ON PDLC MATERIALS. OUR RESULTS CLEARLY DEMONSTRATE THAT THE PDLC DISPLAYS DESCRIBED IN THIS PROPOSAL ARE NOW POSSIBLE TO BUILD AND OPERATE.

PRB ASSOCS INC
47 AIRPORT VIEW DR
HOLLYWOOD, MD 20636
CONTRACT NUMBER:
JEFFREY CALLAHAN
TITLE:
THREAT ASSESSMENT AND RANKING FOR ANTI-SHIP WARFARE
TOPIC# 43 OFFICE: SPAWAR IDENT#: 24426

AS SURFACE SHIP CAPABILITIES IMPROVE, THE PROBLEM OF ASSESSING A SURFACE WARFARE THREAT BECOMES INCREASINGLY IMPORTANT AND COMPLEX. THREAT LEVEL DEPENDS ON NUMEROUS INTERDEPENDENT FACTORS: THE FORCES ARRAYED ON BOTH SIDES, THEIR DISPOSITIONS, AND INTENTIONS; GEOGRAPHY AND OTHER ENVIRONMENTAL CONDITIONS; AND TACTICS AND LOGISTICS OF THE OPPOSING FORCES. THE ABILITY TO QUANTITATIVELY ASSESS ENEMY SHIP CAPABILITIES AND TO DISPLAY AND EVALUATE TACTICAL OPTIONS WOULD BE EXTREMELY VALUABLE TO ANY COMMANDER FACING SUCH A THREAT. PRB ASSOCIATES, INC., PROPOSES TO DEVELOP A PROTOTYPE SURFACE THREAT ASSESSMENT AND RANKING SYSTEM THAT WILL QUANTIFY AS FUNCTIONS OF TIME AND POSITION THE GENERAL THREAT ENVIRONMENT AND RANK SPECIFIC THREAT UNITS ACCORDING TO THEIR ABILITY TO INFLICT DAMAGE ON FRIENDLY FORCES. THE SYSTEM WILL BE BASED ON TECHNOLOGY DEVELOPED FOR THE AN/TSQ-142 TACTICAL MISSION SUPPORT SYSTEM DESIGNED AND BUILT BY PRB ASSOCIATES FOR THE US NAVY.

PRO-ACTIVE RESOURCES
PO BOX 67
SAUNDERSTOWN, RI 02874
CONTRACT NUMBER:
MICHAEL A CESINO
TITLE:
PROVISIONING/SUPPLY SUPPORT REQUIREMENTS UNDER COMPUTER AIDED LOGISTICS SUPPORT
TOPIC# 127 OFFICE: NAVSEA IDENT#: 25002

SUBMITTED BY

THE APPLICATION OF EMERGING COMPUTER TECHNOLOGIES FORMULATE AN OPPORTUNITY TO DEVELOP COMPUTER-AIDED LOGISTICS SUPPORT SYSTEMS. PROVISIONING/SUPPLY SUPPORT, A MAJOR ELEMENT OF INTEGRATED LOGISTICS, IS AN IDEAL CANDIDATE FOR THE APPLICATION OF COMPUTER-AIDED LOGISTICS SUPPORT TOOLS. THIS PROPOSAL WILL (1) DEFINE THE REQUIREMENTS FOR TRANSITIONING CURRENT PROVISIONING/SUPPLY SUPPORT PRACTICES AND POLICIES OVER TO A COMPUTER-AIDED ENVIRONMENT, (2) DOCUMENT BOTH THE METHODS AND APPROACH TAKEN TO BUILD A PROTOTYPE SYSTEM CAPABLE OF SUPPORTING THE REQUIREMENTS DEFINED IN STEP (1). THE PROTOTYPE, ONCE FUNCTIONAL, WILL BE TESTED AND EVALUATED TO DETERMINE THE TECHNICAL AND ECONOMICAL FEASIBILITY OF THE PROPOSED SYSTEM. THE PROTOTYPE WILL FOLLOW ARCHITECTURAL GUIDELINES AND VALIDATED STANDARDS SUCH AS; INFORMATION EXCHANGERS, INFORMATION SERVICES, APPLICATION SYSTEMS, AND PROGRAMMING ENVIRONMENTS.

PROCEDYNE CORP
221 SOMERSET ST
NEW BRUNSWICK, NJ 08903
CONTRACT NUMBER:
JEET BHATIA
TITLE:
FLUIDIZED BED PROCESSING OF Co/WC NANOCOMPOSITE POWDERS
TOPIC# 8 OFFICE: ONR IDENT#: 22383

A NEW PROCESS HAS BEEN DEVISED FOR THE SYNTHESIS OF Co/WC NANO-COMPOSITES POWDERS, STARTING FROM DESIGNED MOLECULAR PRECURSORS. THE PROCESS DIFFERS FROM CONVENTIONAL POWDER METALLURGY METHODS IN THAT IT IS A DIRECT ROUTE FOR MAKING THE MATERIALS WHICH AVOIDS MECHANICAL MILLING AND HANDLING OF POWDERS. THIS PROPOSAL ADDRESSES THE CHALLENGING PROBLEM OF SCALING UP THE PROCESS TO PRODUCE LARGER QUANTITIES OF POWDERED MATERIAL FOR EVALUATION AND TESTING. A FLUIDIZED BED REACTOR OF SPECIAL DESIGN WILL BE USED FOR SCALING UP THE PROCESS. THE ADVANTAGES ARE UNIFORMITY OF TEMPERATURE AND IM-PROVED GAS-SOLID CONTACTING, AND THE POTENTIAL FOR LOW COST COM-MERCIAL POWDER PRODUCTION. SUCH POWDERS CAN BE CONSOLIDATED INTO USABLE STRUCTURAL FORMS BY CONVENTIONAL PLASMA SPRAYING, LASERGLAZING AND COLD COMPACTION/SINTERING. THE CONSOLIDATED PRODUCTS WILL FIND GREAT UTILITY IN CUTTING AND WEAR APPLICATIONS.

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QUALCOMM INC
10555 SORRENTO VALLEY RD
SAN DIEGO, CA 92121
CONTRACT NUMBER:
DR ANDREW J VITERBI
TITLE:
A MULTIPLE-PATH ROUTING ALGORITHM FOR FAULT TOLERANT NETWORK SYST
TOPIC# 38 OFFICE: SPAWAR IDENT#: 24375

WE PROPOSE TO INVESTIGATE FAULT-TOLERANT NETWORK ARCHITECTURES WHICH SUPPORT MULTIPLE-PATH ROUTES. A NEW ALGORITHM HAS BEEN DEVELOPED TO DETERMINE EFFICIENT MULTIPLE-PATH ROUTING STRATEGIES. ADDITIONALLY, WE PLAN TO INTRODUCE AUTOMATIC PATH RE-ROUTING BY INTRODUCING ERROR-CORRECTING CODING REDUNDANCIES INVOLVING A CODE STRUCTURE ON ALL TRANSMITTED DATA. WE PLAN TO STUDY THE COMBINED BENEFITS OF THESE TECHNIQUES.

QUANTIC INDUSTRIES INC
990 COMMERCIAL ST
SAN CARLOS, CA 94070
CONTRACT NUMBER:
JOHN T PETRICK
TITLE:
EMBEDDED LASER IGNITION DEVICE FOR ROCKET MOTORS
TOPIC# 206 OFFICE: NWC IDENT#: 23157

THIS EFFORT WILL CONCENTRATE ON THE DEVELOPMENT AND FEASIBILITY DEMONSTRATION OF AN ARM-FIRE DEVICE (AFD) USING A Zr WOOL PUMPED LASER AS THE IGNITION SOURCE. THE AFD WILL CONTAIN A Nd:YAG OR Nd:GLASS LASER ELEMENT, A SAFE/ARM (S/A) OPTICAL SHUTTER, FOCUSING OPTICS, OPTICAL FIBER INTERFACE, AND A SINGLE OPTICAL FIBER TRANSFER LINE LEADING TO AN IGNITION ELEMENT. AN ALTERNATE SAFING METHOD WILL BE CONSIDERED WHICH DEPRIVES THE Zr OR O(2) UNTIL ARMING OCCURS. THE IGNITION ELEMENT WILL CONTAIN EITHER AN ENERGETIC MATERIAL LISTED IN MIL-STD-1316C OR CONVENTIONAL ROCKET MOTOR IGNITER OUTPUT CHARGES SUCH AS BKNO(3) OR ZrKC10(4)-C. AT LEAST ONE MIL-STD-1316C MATERIAL

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HAS A HISTORY OF LASER INITIATION FROM SOURCES OF THE SAME FLUENCE AS THE PROPOSED LASER. THE OUTPUT OF THE PROPOSED LASER SOURCE SHOULD BE ABLE TO SIMULTANEOUSLY INITIATE APPROXIMATELY TEN SUCH IGNITION ELEMENTS. RELIABILITY AND SAFETY FAILURE PREDICTIONS WILL BE MADE USING CURRENTLY AVAILABLE MODELS.

QUANTIC INDUSTRIES INC
990 COMMERCIAL ST
SAN CARLOS, CA 94070
CONTRACT NUMBER:
JOHN T PETRICK
TITLE:
LASER INITIATION OF INSENSITIVE HIGH EXPLOSIVES
TOPIC# 155 OFFICE: NSWC IDENT#: 23718

QUANTIC PROPOSES TO INVESTIGATE SEVERAL UNIQUE METHODS OF DIRECTLY DETONATING INSENSITIVE HIGH EXPLOSIVES WITH A SMALL, 750 mJ, 1.06 MICRON, Q-SWITCHED LASER. ONE TECHNIQUE USES MULTIPLE LASER PULSES WITH REFLECTED SHOCK AUGMENTATION. A SECOND TECHNIQUE USES SLAPPER INITIATION TECHNOLOGY, AND ANOTHER USES SHOCK INTERFERENCE EFFECTS. THE OBJECTIVE IS TO DEMONSTRATE THAT A TACTICAL MISSILE COMPATIBLE LASER CAN BE DEVELOPED TO DIRECTLY INITIATE DETONATION IN HIGHLY INSENSITIVE EXPLOSIVES.

RD INSTRUMENTS
9855 BUSINESSPARK AVE
SAN DIEGO, CA 92131
CONTRACT NUMBER:
FRAN ROWE
TITLE:
IN-SITU ACOUSTIC SCINTILLATION FLOW SENSOR WITH APPLICATION TO HYDROTHERMAL VENTS
TOPIC# 3 OFFICE: ONR IDENT#: 22345

WE PROPOSE TO STUDY THE FEASIBILITY OF DEVELOPING AN IN-SITU ACOUSTIC SCINTILLATION SENSOR FOR MEASUREMENT OF MEAN FLOW ACROSS AND ALONG THE LINE SEPARATING TWO OPPOSING ACOUSTIC TRANSCEIVER ARRAYS. SUCH

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A DEVICE SHOULD BE CAPABLE OF MEASURING FLOW COMPONENTS IN A 2-DIMENSIONAL AREA DEFINED BY THE ARRAYS. IT COULD BE ADAPTED FOR RESOLVING FLOW SCALES FROM LESS THAN 1 m TO SEVERAL km. THE STUDY WILL FOCUS ON THE APPLICATION OF THIS SENSOR TO MEASURING FLOW PROPERTIES OF HYDROTHERMAL VENTS AND VENT FIELDS, INCLUDING MEAN FLUX AND TEMPORAL VARIABILITY IN FLUX, TEMPERATURE, INTENSITY OF REFRACTIVE INDEX TURBULENCE AND ECHO BACKSCATTER. FOR THE PURPOSE OF EVALUATING THE PRACTICAL REALIZABILITY AND PERFORMANCE OF THE GENERAL APPROACH, WE WILL FOCUS ON 1-m SCALE MEASUREMENTS FOR STUDY OF FLOW FEATURES OF INDIVIDUAL VENTS, AND 100-m SCALE MEASUREMENTS FOR STUDY OF VENT FIELDS. WE WILL CARRY OUT EXTENSIVE THEORETICAL STUDIES TO DETERMINE THE INFLUENCE OF THE ENVIRONMENT'S ACOUSTIC PROPAGATION CHARACTERISTICS ON MEASUREMENT ACCURACY. LIMITED-SCALE LABORATORY AND FIELD TESTING WILL THEN BE PERFORMED TO VERIFY THE THEORETICAL RESULTS. THIS WILL PROVIDE A SOUND BASIS FOR THE FURTHER DEVELOPMENT OF A PROTOTYPE INSTRUMENT.

REFRACTORY COMPOSITES INC
12220-A RIVERA RD
WHITTIER, CA 90606
CONTRACT NUMBER:
E L PAQUETTE
TITLE:
HIGH CHAR YIELD POLYMER MATRIX COMPOSITES
TOPIC# 103 OFFICE: NAVSEA IDENT#: 24803

STATE-OF-THE-ART CARBON-CARBON COMPOSITE PROCESSING GENERALLY EMPLOYS PYROLIZED PHENOLIC, FUFERAL, PITCH OR COMBINATIONS OF THESE MATERIALS AS MATRIX MATERIALS. BECAUSE THE CHAR YIELD IS IN THE 50% RANGE, MULTIPLE IMPREGNATION AND PROCESSING STEPS ARE REQUIRED. ADDITIONALLY, THE HIGH VOLATILE CONTENT CAN CAUSE DELAMINATION AND PART LOSS DURING PROCESSING. NEW HIGH CHAR YIELD RESINS SUCH AS H RESIN OR POLYARYL ACETYLENES (PAA'S) HAVE RESIDUAL WEIGHT YIELDS AS HIGH AS 88%. THE USE OF THESE RESINS WILL BE EVALUATED RELATIVE TO ACHIEVING STRUCTURALLY SOUND, DIMENSIONALLY STABLE, LOW COST CARBON-CARBON COMPOSITES.

REKENTHALER TECHNOLOGY ASSOCS CORP
3400 JENNINGS CHAPEL RD
WOODBINE, MD 21797
CONTRACT NUMBER:
DR WILLIAM W TAYLOR
TITLE:
AEGIS AAW SEMINAR WARGAME MODEL
TOPIC# 81 OFFICE: NAVSEA IDENT#: 24625

SUBMITTED BY

DEFINITION OF THE DETAILED CONCEPT FOR A P.C.-BASED AAW UMPIRE'S SCORING SYSTEM FOR THE AEGIS WEAPON SYSTEM. DEFINITION OF THE TOP-LEVEL REQUIREMENTS FOR THE SYSTEM, INCLUDING COMPUTER HARDWARE/SOFTWARE/DISPLAY EQUIPMMENTS AS WELL AS REQUIREMENTS ON THE AEGIS SYSTEM PERFORMANCE MODEL TO BE EMPLOYED. IDENTIFICATION OF THE RELEVANT INFORMATION AND DATA FOR MODELING THE AEGIS WEAPON SYSTEM PERFORMANCE. SPECIFICATION OF THE MODEL ARCHITECTURES, INCLUDING HARDWARE AND SOFTWARE, AND DATA BASES TO IMPLEMENT THE P.C.-BASED MODEL. DEFINITION OF A FINAL MASTER PLAN. FOCUS IS ON THE AEGIS AAW SYSTEM MODEL, DATA BASE AND DESKTOP COMPUTER CONFIGURATION REQUIREMENTS THAT WOULD BE NEEDED TO DEVELOP AN AAW ENGAGEMENT MODEL ON A DESKTOP COMPUTER TO ASSIST A WARGAME UMPIRE TO SCORE AEGIS AAW ENGAGEMENTS. THIS P.C.-BASED SCORING MODEL WILL BE DESIGNED/DEVELOPED WITH INTERACTIVE INPUT/OUTPUT THAT IS ORIENTED TO SUPPORT THE AAW UMPIRE IN A SEMINAR TYPE WARGAME. COMPUTER ASSISTED GRAPHICS PROVIDED BY THE P.C.-BASED MODEL WILL ASSIST THE UMPIRE TO CONDUCT THE FUNCTIONS HE PERFORMS DURING THE WARGAME.

RESEARCH OPPORTUNITIES INC
2200 AMAPOLA CT - STE 101
TORRANCE, CA 90501
CONTRACT NUMBER:
WILLIAM C RILEY
TITLE:
DUCTILE Ti(3)Al ALLOYS FOR TACTICAL MISSILES
TOPIC# 99 OFFICE: NAVSEA IDENT#: 24787

THE PHASE I OBJECTIVE IS TO SHOW THE FABRICATION FEASIBILITY OF A DUCTILE TITANIUM ALUMINIDE ALLOY THAT IS SUITABLE FOR USE AS A STRUCTURAL MATERIAL IN FUTURE NAVSEA TACTICAL MISSILE SYSTEMS. A SPECIFIC GOAL IS TO PROVIDE A MATERIAL THAT HAS A DENSITY OF APPROXIMATELY 50% OF THAT OF SUPERALLOYS AND A SIMILAR OPERATING TEMPERATURE. THE APPROACH IS TO UTILIZE ZIRCONIUM AS A SUBSTITUTIONAL ELEMENT FOR TITANIUM IN THE Ti(3)AL HIGLY ORDERED HEXAGONAL CRYSTAL LATTICE STRUCTURE. THIS WILL HAVE THE EFFECT OF CREATING A MINOR EXPANSION AND "DISORDERING" OF THE LATTICE AND THUS, WILL CREATE MORE POSSIBILITIES FOR ADDITIONAL SLIP PLANS WITHIN THE CRYSTAL.

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FOR MAXIMUM DUCTILITY, PURITY OF ALL STARTING MATERIALS IS CONSIDERED ESSENTIAL AND VACUUM CASTING WILL AVOID CONTAMINATION FROM OXYGEN, HYGEN AND NITROGEN. CONTROLLED VARIATIONS IN THE ALUMINUM, TITANIUM, AND ZIRCONIUM CONTENT WILL BE USED IN ORDER TO DETERMINE THE OPTIMUM DUCTILITY AND ELEVATED TEMPERATURE SPECIFIC MECHANICAL PROPERTIES OF THE ALLOY. COMPOSITIONS AS HIGH IN Zr AS 45Zr, 45Ti, 10Al WILL BE FABRICATED AND TESTED. IN PHASE II, ACTIVITIES WILL INCLUDE (1) USE OF MORE DUCTILE TiZrAl ALLOY AS A COMPOSITE MATRIX, AND (2) A DEMONSTRATION OF ALLOY FABRICABILITY OF ACTUAL TACTICAL MISSILE STRUCTURAL COMPONENTS.

RESHET INC
314 - N 32ND ST
PHILADELPHIA, PA 19104
CONTRACT NUMBER:
DR JAMES EILBERT
TITLE:
REAL-TIME MODEL-BASED OBJECT RECOGNITION USING A COMBINED NEURAL NETWORK/EXPERT SYSTEM
TOPIC# 137 OFFICE: NSWC IDENT#: 23579

THIS PROPOSAL IS MOTIVATED BY THE COMPLEMENTARY CAPABILITIES OF EXPERT SYSTEM AND NEURAL NETWORK (NN) TECHNOLOGIES, AND BY THE POTENTIAL FOR A COMBINED SYSTEM TO PERFORM MORE EFFECTIVELY THAN EITHER ALONE. THE LOCAL, BOTTOM-UP APPROACH TO VISION CANNOT DEAL WITH THE NOISE AND THE ON-GOING PRODUCTION OF NOVELTY IN REAL VISUAL SCENES, WHILE EXPERT SYSTEM APPROACHES ARE TOO BRITTLE AND SLOW TO DO REAL-TIME IMAGE PROCESSING. WE BELIEVE THE COMBINED NN/EXPERT SYSTEM ARCHITECTURE IN THIS PROPOSAL WILL OVERCOME MANY OF THE PROBLEMS WITH PREVIOUS APPROACHES. THE PROPOSED PROJECT HAS 2 PRIMARY GOALS: 1) TO CONSTRUCT A COMPUTER APPLICATION THAT COMBINES A NEURAL NETWORK (NN) COMPONENT AND AN EXPERT SYSTEM COMPONENT IN A WAY THAT ENHANCES THE PERFORMANCE OF EACH; 2) USE THE SYSTEM TO CREATE FASTER MORE FLEXIBLE SOLUTIONS TO EXPERT LEVEL PROBLEMS IN VISION.

REYNOLDS INDUSTRIES SYSTEMS INC (RISI)
3420 FOSTORIA WY
SAN RAMON, CA 94583
CONTRACT NUMBER:
DAVID DEAM
TITLE:
PIEZOELECTRIC DETONATOR
TOPIC# 207 OFFICE: NWC IDENT#: 23165

SUBMITTED BY

LOW ENERGY FLYING PLATE DETONATORS USING CONVENTIONAL INVERTER AND CAPACITOR DISCHARGE FIRING SYSTEMS ARE LIMITED TO THE REDUCTION IN THEIR SIZE BY THE NUMBER OF ELECTRICAL COMPONENTS REQUIRED AND THE EXTERNAL POWER SOURCE. PIEZOELECTRIC MATERIALS OFFER THE POSSIBILITIES OF GREATLY REDUCING THE NUMBER OF COMPONENTS REQUIRED TO FUNCTION A FLYING PLATE DETONATOR AND THEREFORE REDUCE SYSTEM VOLUME. PIEZOELECTRIC MATERIALS CAN BE ADAPTED TO GENERATE THEIR ENERGY FROM THE ENVIRONMENT WHICH IS REQUIRED FOR SAFE OPERATION. THIS PROPOSAL PROGRAM WILL EVALUATE A FLYING PLATE DETONATOR DESIGNED TO BE FUNCTIONED BY A PIEZOELECTRIC PULSE. PROTOTYPE AND THRESHOLD TESTS WILL BE CONDUCTED AND FEASIBILITY WILL BE DETERMINED. THE EXPECTED RESULTS ARE A FLYING PLATE DETONATOR WHICH WILL FUNCTION FROM THE MECHANICAL STRESSING OF A PIEZOELECTRIC MATERIAL IN THE RANGE OF ONE CUBIC INCH VOLUME. RISI WILL USE ITS 17 YEARS OF EXPERIENCE IN DESIGN OF SECONDARY INITIATORS TO INTEGRATE THIS POWER SOURCE WITH A FLYING PLATE DETONATOR.

ROW RESEARCH ASSOCS
PO BOX 923
DESTIN, FL 32541
CONTRACT NUMBER:
RODERICK J ROW
TITLE:
PILOT ANTI-G CONCEPTS
TOPIC# 18 OFFICE: ONT IDENT#: 24225

A COMBINED ANTI-G AND PRESSURE SUIT INTENDED FOR USE IN A HIGH PERFORMANCE AIRCRAFT. INCLUDES A HELMET WHICH IS FED RESPIRATORY AIR AND A CO-OPERATING BODY SUIT COMPRISED OF A PLURALITY OF AIR-TIGHT TOROIDAL AIR SEGMENTS, WHICH SURROUND THE WEARER'S BODY FROM THE NECK TO THE FEET AND WHICH, INDEPENDENTLY, ARE PRESSURIZED SO AS TO MATCH THE FLUID PRESSURES RESULTING FROM THE VERTICAL ACCELERATION OF THE AIRCRAFT.

S-TRON
101 TWIN DOLPHIN DR
REDWOOD CITY, CA 94065
CONTRACT NUMBER:
WILLIAM WALKER
TITLE:
BROADBAND TRANSDUCER
TOPIC# 230 OFFICE: NCSC IDENT#: 23512

SUBMITTED BY

ACOUSTIC PROJECTOR TRANSDUCERS ARE THE PERFORMANCE LIMITING SUBSYSTEM FOR MANY ACTIVE UNDERWATER SOUND SYSTEMS. SIGNAL PROCESSING DEVELOPMENTS AND UNDERWATER ACOUSTIC RECEIVER DEVELOPMENTS HAVE DRAMATICALLY IMPROVED THE PERFORMANCE OF SONAR SYSTEMS SINCE WORLD WAR II. TRADITIONALLY, PROJECTOR AND RECEIVER TRANSDUCERS HAVE BEEN USED RECIPROCALLY WITH SATISFACTORY PERFORMANCE. HOWEVER, SOME OF THE MATERIALS AND MANY OF THE DESIGN INNOVATIONS THAT HAVE BEEN USED TO BROADEN THE BANDWIDTH AND IMPROVE THE GENERAL PERFORMANCE OF RECEIVERS ARE NOT APPLICABLE TO PROJECTOR TRANSDUCERS. THE DESIGN OF EFFICIENT SONAR PROJECTORS RELIES UPON OPERATION OF THE DEVICE AT OR NEAR THE RESONANT FREQUENCY OF THE TRANSDUCER. THE TRADITIONAL TRADEOFF FOR PIEZOELECTRIC OR MAGNETOSTRICTIVE PROJECTOR TRANSDUCERS HAS BEEN TO SACRIFICE OUTPUT EFFICIENCY AND SIZE FOR BANDWIDTH. A PROJECTOR DESIGN IS AVAILABLE WHICH OVERCOMES THE SEVERITY OF THIS COMPROMISE. THE COMPOSITE TRANSDUCER DESIGN IS DESCRIBED IN THE FOLLOWING PROPOSAL. A FEASIBILITY STUDY AND EXPERIMENTAL PROGRAM IS PROPOSED WHICH WILL SERVE TO DEMONSTRATE THE TRANSDUCER CONCEPT. THE PHASE I OBJECTIVES ARE: 1) DEFINE THE PROJECTOR REQUIREMENTS, 2) ASSESS THE CURRENT TECHNOLOGY, 3) ANALYTICALLY COMPARE SEVERAL NEAR TERM ALTERNATIVES, 4) PERFORM A CONCEPT TRADEOFF STUDY, 5) IDENTIFY KEY TECHNOLOGY ISSUES, 6) PERFORM AN EXPERIMENTAL PROOF OF PRINCIPLE, 7) PREPARE A DEVELOPMENT PLAN FOR ENGINEERING DEVELOPMENT OF THE CONCEPT.

S-TRON
101 TWIN DOLPHIN DR
REDWOOD CITY, CA 94065
CONTRACT NUMBER:
ROBERT C MAWHINNEY
TITLE:
PERSONAL PROTECTIVE SYSTEMS FOR SHIPBOARD DAMAGE CONTROL AND FIREFIGHTING
TOPIC# 88 OFFICE: NAVSEA IDENT#: 24571

THE U.S. NAVY IS FACING SUBSTANTIALLY INCREASED THREAT LEVELS DUE TO NEW MISSION ASSIGNMENTS AND INCREASED LETHALITY OF OPPOSING FORCE WEAPON SYSTEMS. THIS INCREASINGLY HOSTILE ENVIRONMENT IS BEING COUNTERED WITH DAMAGE CONTROL AND FIREFIGHTING ASSETS THAT WERE

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ORIGINALLY DESIGNED FOR THE THREATS OF WW II. FURTHERMORE, THE DAMAGE CONTROL/FIREFIGHTING (DC/FF) EQUIPMENT THAT EXISTS WAS NOT DESIGNED TO OPERATE AS AN INTEGRATED SYSTEM. CONSEQUENTLY, NAVAL ASSETS ARE EXPOSED TO GREATER RISKS THAN NECESSARY. RECENT MARITIME HOSTILITIES HAVE UNDERSCORED THE NEED FOR SIGNIFICANT ADVANCES IN DC/FF EQUIPMENT AND OVERALL SYSTEM INTEGRATION TO REDUCE OUR RELIANCE ON PERSONAL HEROICS AND LUCK IN FIGHTING FIRES AND CONTROLLING CASUALTIES ON SHIPS. THE PROPOSED EFFORT WILL FOCUS ON A SYSTEMATIC STUDY OF FOUR AREAS: THE CURRENT AND FUTURE THREATS THAT THE NAVY FACES, THE TASKS THAT MUST BE ACCOMPLISHED NOW AND IN THE FORESEEABLE FUTURE IN DC/FF, THE AVAILABLE EQUIPMENT AND TECHNOLOGIES THAT CAN BE USED TO ACCOMPLISH DC/FF TASKS AND THE INDIVIDUAL PROTECTIVE EQUIPMENT THAT IS REQUIRED FOR OPERATING THE DC/FF GEAR IN PERFORMING SPECIFIC TASKS UNDER THE VARIOUS POSSIBLE ENVIRONMENTS THAT CAN BE ANTICIPATED. A SYSTEMS ENGINEERING APPROACH WILL BE USED TO DEFINE THE REQUIREMENTS FOR AN ENSEMBLE OF PERSONAL PROTECTIVE EQUIPMENT, WHICH MAY BE IN A MODULAR FORM, TO ALLOW OPTIMAL RESPONSE TO SHIPBOARD DISASTERS.

SAT-CON TECHNOLOGY CORP
71 ROGERS ST
CAMBRIDGE, MA 02142
CONTRACT NUMBER:
GEORGE V ANASTAS JR
TITLE:
NON-CONTACTING MAGNETIC GEARS FOR USE IN QUIET SPEED REDUCERS
TOPIC# 116 OFFICE: NAVSEA IDENT#: 24917

THE INTRODUCTION OF THE TURBINE POWER PLANT AS A TORPEDO PRIME MOVER CREATED A SPEED AND TORQUE MISMATCH BETWEEN THE POWER PLANT AND THE PROPELLER. CONVENTIONAL GEARTRAIN TECHNOLOGY IS CURRENTLY USED TO TRANSFORM ENGINE SHAFT OUTPUT TO THAT REQUIRED BY THE PROPELLER. THE INHERENT MESH NOISE GENERATED BY THE GEARSETS IS UNDESIRABLE. THE RESEARCH PROPOSED HEREIN WILL INITIATE THE DEVELOPMENT OF NON-CONTRACTING MAGNETIC GEARS CONFIGURED IN A PLANETARY FORMAT. THE SUBSTANTIAL AIR GAPS REQUIRED BETWEEN THE REDUCTION STAGES INHIBIT THE TRANSMISSION OF DRIVETRAIN VIBRATIONS, THEREBY REDUCING OVERALL SYSTEM NOISE. POWER CONSUMED BY THE SYSTEM SHOULD BE RELATIVELY SMALL, SINCE THE REDUCTION OCCURS WITH CONSTANT RELATIVE TANGENTIAL

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VELOCITIES BETWEEN THE REDUCTION STAGES. SUPPORT SYSTEMS WILL INCLUDE POWER MANAGEMENT AND POSSIBLE ACTIVE CONTROL OF THE MAGNETICS. THE PROPOSED RESEARCH WILL VERIFY THE CONCEPT AND WILL RESULT IN A DESIGN DEFINITION OF THE MAGNETIC GEARS, IDENTIFYING POWER AND SUPPORT SYSTEM REQUIREMENTS. A LABORATORY PROTOTYPE WILL BE CONSTRUCTED AND TESTED AS A PHASE II EFFORT.

SCIDMORE & SHEAN
RT 8 - BOX 160A
BRANT LAKE, NY 12815
CONTRACT NUMBER:
WRIGHT H SCIDMORE
TITLE:
STUDY OF A ZOOM LENS FOR FORWARD LOOKING INFRARED SYSTEMS
TOPIC# 213 OFFICE: NADC IDENT#: 24038

PHASE I STUDY OF THE FEASIBILITY OF DEVELOPING A ZOOM LENS AS DESCRIBED IN SBIR TOPIC N88-213 IS PROPOSED. THE OBJECTIVE OF THIS STUDY IS TO INVESTIGATE ALTERNATIVE CONFIGURATIONS TO FIND THE ONE MOST EFFECTIVE IN MINIMIZING COST, SIZE, AND WEIGHT WHILE OFFERING APPROPRIATE OPTICAL CHARACTERISTICS AND PERFORMANCE. AN AFOCAL ZOOM LENS OF 0.6x TO 3.0x MAGNIFICATION, APERTURE OF f/2 FIELDS OF VIEW/SPECTRAL RANGE COMMENSURATE WITH FLIR COMMON MODULE ASSEMBLIES; AND 10 INCH MAXIMUM BARREL LENGTH WILL BE TAKEN AS TYPICAL SPECIFICATIONS SUBJECT TO REFINEMENT DURING DISCUSSIONS WITH COGNIZANT NAVY PERSONNEL FOLLOWING CONTRACT AWARD. CONFIGURATIONS TO BE STUDIED WILL INCLUDE NEW ONES INDICATED BY SPECIAL INTERFACE CONSIDERATIONS ALONG WITH THOSE CHOSEN FROM EXPERIENCE OF THE KEY INVESTIGATORS IN CONCEPT, DESIGN, AND PRODUCTION OF COMMERCIAL ZOOM LENSES AND SPECIALIZED OPTICS FOR MILITARY APPLICATIONS.

SCIENCE RESEARCH LAB INC
15 WARD ST
SOMERVILLE, MA 02143
CONTRACT NUMBER:
DANIEL BIRX
TITLE:
IMPROVED RELATIVISTIC KLYSTRON DESIGNS FOR COMPACT HIGH GRADIENT PURE MMODE ACCELERATOR APPLICATIONS
TOPIC# 171 OFFICE: NSWC IDENT#: 23843

SUBMITTED BY

THR RECENTLY DEVELOPED PURE MODE OF CHARGED PARTICLE BEAM WEAPON (CPBW) PROPAGATION WILL REQUIRE DEVELOPMENTS IN HIGH CURRENT, HIGH GRADIENT RF ACCELERATORS IF DEPLOYMENT ON MOBILE PLATFORMS IS TO BE FEASIBLE. IT APPEARS THAT RELATIVISTIC KLYSTRONS ARE LIKELY TO BE THE MOST FAVORABLE CANDIDATE FOR EFFICIENTLY GENERATING THE RF POWER TO DRIVE THESE ACCELERATORS. CURRENT DESIGNS FOR HIGH GRADIENT RF ACCELERATORS AIMED AT PURE MODE PROPAGATION EXPERIMENTS ARE DOMINATED BY THE SIZE AND WEIGHT OF THE HIGH POWER RF DRIVE SOURCES. RECENT STUDIES AT SRL INDICATE THAT MOBILE PURE-MODE ACCELERATORS WILL BE FEASIBLE ONLY IF THE SIZE AND WEIGHT OF THESE ACCELERATORS CAN BE REDUCED. GRADIENTS IN EXCESS OF 200 MeV/METER APPEAR FEASIBLE WITH ACCELERATOR STRUCTURE WEIGHTS OF LESS THAN 100 kg/GeV. HOWEVER, THE WEIGHT CORRESPONDING TO THE INDUCTION LINAC-BASED RELATIVISTIC KLYSTRON DRIVERS WOULD CURRENTLY EXCEED 10,000 kg/GeV. OUR GOAL WOULD BE TO DESIGN AN OPTIMIZED INDUCTION LINAC-DRIVEN RELATIVISTIC KLYSTRON WHICH WOULD DEMONSTRATE AN ORDER OF MAGNITUDE REDUCTION IN SIZE AND WEIGHT OVER THE CURRENT STATE-OF-THE-ART WHILE PROVIDING IMPROVED PERFORMANCE.

SCIENCE SERVICES
4122 MIDDLEBROOK DR
DAYTON, OH 45440
CONTRACT NUMBER:
DR THOMAS A LEONARD
TITLE:
DEVELOPMENT OF PATCI - A PROTOTYPE AUTOMATED TRANSMISSION/CONTRAS INSTRUMENT
TOPIC# 208 OFFICE: NWC IDENT#: 23170

CANDIDATE POLARIZEDS FOR MISSILE FUSE ASSEMBLIES CAN EXHIBIT STRONG SPACIAL AND WAVE LENGTH VARIATIONS IN TRANSMISSION AND CONTRAST. A PROTOTYPE INSTRUMENT IS PROPOSED FOR RAPID, AUTOMATED TRANSMISSION AND CONTRAST MEASUREMENTS TO CHARACTERIZE POLARIZERS DURING DEVELOPMENT OR IN PRODUCTION QUANTITIES. A SPINNING CALCITE PRISM POLARIZER IS USED TO PROVIDE HIGH CONTRAST CAPABILITY OVER VISIBLE AND NEAR INFRARED WAVE LENGTHS. THE INSTRUMENT IS MODULAR AND DESIGNED TO BE COMPACT, EASY TO OPERATE, MAINTAIN AND CONSTRUCT. OPERATION AND DATA ANALYSIS IS COMPUTER CONTROLLED.

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SEMETEX CORP
3445 KASHIWA ST
TORRANCE, CA 90505
CONTRACT NUMBER:
DR ARAM TANIELIAN
TITLE:
HIGH SPEED OPTICAL PROCESSING
TOPIC# 194 OFFICE: NSWC IDENT#: 23995

RECENTLY A NONLINEAR OPTICAL PROCESSOR HAS BEEN INTRODUCED THAT CAN PERFORM REAL-TIME PATTERN RECOGNITION OF A SCENE CONTAINING MULTIPLE OBJECTS WITH MULTIPLE REFERENCE PATTERNS IN PARALLEL AND IT CAN OPTICALLY AND/OR ELECTRICALLY UPDATE BOTH THE INPUT SCENE AND THE REFERENCE SIGNALS IN REAL-TIME. THEORETICAL AND NUMERICAL STUDIES HAVE SHOWN THAT THE PERFORMANCE OF THIS NONLINEAR CORRELATOR IS SUBSTANTIALLY SUPERIOR TO THE EXISTING CONVENTIONAL OPTICAL CORRELATORS IN THE AREAS OF LIGHT EFFICIENCY, AUTOCORRELATION PEAK TO SIDELOBE RATIO, AUTOCORRELATION BANDWIDTH, AND DISCRIMINATION SENSITIVITY. THE NONLINEAR OPTICAL PROCESSOR PRODUCES DELTA FUNCTION LIKE CORRELATION SIGNALS WITH SIGNIFICANTLY HIGHER AUTOCORRELATION PEAK INTENSITY, LOWER AUTO CORRELATION SIDELOBES, AND LOWER CROSS CORRELATION VALUES. IT IS PROPOSED THAT THE RESULTS OF THOSE THEORETICAL AND NUMERICAL INVESTIGATIONS BE CONFIRMED BY MEASUREMENTS TO BE MADE ON AN EXPERIMENTAL MODEL OF THE REAL-TIME NONLINEAR OPTICAL CORRELATOR.

SENSOR DATA INTEGRATION INC
342 CATERINA HEIGHTS
CONCORD, MA 01742
CONTRACT NUMBER:
DR SAM CHAUDHURI
TITLE:
DATA FUSION
TOPIC# 219 OFFICE: NUSC IDENT#: 23091

THE PROPOSED RESEARCH WILL ADDRESS THE DEVELOPMENT OF A DATA FUSION

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SYSTEM ALONG WITH THE TECHNIQUES TO INCREASE SCIENTIFIC KNOWLEDGE OF DATA PROCESSINGS IN INTELLIGENT SENSORY SYSTEMS. THE KNOWLEDGE-BASED SYSTEMS FOR THE NAVY'S DATA FUSION SYSTEM REQUIRES THE CO-OPERATIVE INTERACTION OF DISTRIBUTED KNOWLEDGE SOURCES SUPPORTING TACTICAL AND STRATEGIC MILITRAY OPERATIONS. THE STUDY WILL DEVELOP (1) MULTISENSOR DATA FUSION HIERARCHY WHICH WOULD INCLUDE DATA ALIGNMENT, CORRELATION, AND SITUATION ASSESSMENT, (2) COMPUTING ARCHITECTURES FOR INTEGRATING NUMERICAL AND SYMBOLIC ASPECTS, (3) COOPERATIVE KNOWLEDGE-BASED SYSTEMS THAT CAN INCREASE AUTOMATION IN THE FORM OF INNOVATIVE SIGNAL PROCESSING TO MAKE ACCURATE AND REAL-TIME DECISIONS AND TO ENHANCE THE TOTAL SYSTEM PERFORMANCE AND RELIABILITY. THE RESEARCH WILL FOCUS ON THE DATA FUSION ARCHITECTURE FROM ALTERNATIVE APPROACHES AND CONSIDER THE IMPLEMENTATION OF A DEMONSTRATION SYSTEM. THE STRENGTH AND LIMITATIONS OF THE PROPOSED KNOWLEDGE-BASED SYSTEMS FOR DATA FUSION WILL ALSO BE DISCUSSED.

SESCO INC (SYS ENHANCEMENT SVCS CO INC)
2011 CRYSTAL DR - STE 1100
ARLINGTON, VA 22202
CONTRACT NUMBER:
JOHN EDYVANE
TITLE:
SHIPBOARD ROBOTIC MOBILITY
TOPIC# 239 OFFICE: NOSC IDENT#: 24140

SHIP MOTION IMPACT AND SHIP CONFIGURATION CONSTRAINTS WILL BE QUANTIFIED AND USED TO DEVELOP THE REQUIREMENTS FOR MOBILE ROBOTIC SYSTEMS TO PERFORM IN SEAWAY CONDITIONS ABOARD NAVAL SHIPS. BASED UPON THESE REQUIREMENTS, CONCEPTUAL DESIGNS OF SIX MOBILE TELEROBOTIC SYSTEMS TO MEET VARIOUS SHIPBOARD MISSION REQUIREMENTS WILL BE DEVELOPED. THESE DESIGNS WILL BE EVALUATED AS TO EFFECTIVENESS OF MISSION PERFORMANCE. THIS EVALUATION WILL PROVIDE VALIDATION OF SYSTEM MOBILITY DESIGN FEATURES WHICH ARE MOST SUITABLE TO THE SHIPBOARD ENVIRONMENT. ADDITIONALLY, SHIP CONFIGURATION (ARRANGMENT, ACCESSES, COMPARTMENTATION ETC.) WILL BE ANALYZED WITH THE OBJECTIVE OF DEVELOPING DESIGN CHANGES (BOTH FOR BACKFIT AND NEW SHIP DESIGNS) WHICH WILL IMPROVE THE COMPATIBILITY OF THE SHIPBOARD ENVIRONMENT WITH MOBILE ROBOTIC SYSTEMS.

SIAGENIC INC
1810 MAGNAVOX WY
FORT WAYNE, IN 46804
CONTRACT NUMBER:
D JAMES MORRE
TITLE:
LIPOSOME SIALIDATION
TOPIC# 5 OFFICE: ONR IDENT#: 22360

SUBMITTED BY

THIS PROPOSAL IS TO DEMONSTRATE FEASIBILITY OF INSERTION OF SIALIC ACID MOLECULES INTO MEMBRANES OF LIPOSOMES CARRYING HEMOGLOBIN. THE LIPOSOMES MAY BE PROVIDED BY NAVY CONTRACTORS OR PREPARED BY OFFEROR ACCORDING TO CONTRACTORS' SPECIFICATIONS FOR FOMULATION. THE ADDED SIALIC ACID WILL PROTECT THE LIPOSOMES FROM CLEARANCE BY THE RETICULOENDOTHELIAL SYSTEM AND THEREBY INCREASE THE RESIDENCY TIME OF THE LIPOSOMES IN THE CIRCULATION. NATURALLY-OCCURRING MOLECULES CONTAINING SIALIC ACID, CHIEFLY GANGLIOSIDES, WILL BE UTILIZED INITIALLY FOR THIS PURPOSE. THESE MOLECULES ARE OF LOW INTRINSIC ANTIGENICITY AND INTERCALATED SPONTANEOUSLY INTO LIPOSOMES WITH THE FORMATION OF STABLE ASSOCIATIONS. THE SIALIC ACID-RICH CARBOHYDRATE PORTIONS ARE DIRECTED TO THE EXTERNAL, AQUEOUS ENVIRONMENT. MODEL COMPOUNDS SUCH AS GANGLIOSIDE MINICS THAT CONTAIN SIALIC ACID OR OTHER CHARGED GROUPS WILL THEN BE DEVELOPED FOR ECONOMICAL LARGE-SCALE PRODUCTION OF NONPYROGENIC, CLEARANCE-RESISTANT LIPOSOMES CONTAINING HEMOGLOBIN THAT ARE BOTH INVISIBLE TO IMMUNE SURVEILLANCE AND THAT RETAIN FULL OXYGEN-CARRYING CAPACITY.

SILICON DESIGNS INC
1445 NW MALL ST
ISSAQUAH, WA 98027
CONTRACT NUMBER:
JOHN C COLE
TITLE:
A LOW ENERGY FLYING PLATE DETONATOR
TOPIC# 207 OFFICE: NWC IDENT#: 23167

THE SAFETY OF THE FLYING PLATE DETONATOR IS KEY TO ITS USE IN IN-LINE FUZES. THE MAIN ADVANTAGE OF THE FLYING PLATE DETONATOR IS ONE OF ITS ADVANTAGES FROM A SAFETY VIEWPOINT; A SUBSTANTIAL AMOUNT OF ELECTRICAL ENERGY, ON THE ORDER OF A JOULE, MUST BE DELIVERED TO THE BRIDGE IN LESS THAN A MICROSECOND BEFORE THE UNIT WILL FIRE. THE FLYING PLATE DETONATOR, HOWEVER, HAS CHANGED LITTLE SINCE ITS ORIGINAL DEVELOPMENT BY LAWRENCE LIVERMORE LABORATORIES. ALTHOUGH EVOLUTIONARY CHANGES HAVE REDUCED ITS FIRING ENERGY REQUIREMENTS, THE SIZE OF SUPPORTING COMPONENTS STILL REMAINS A PROBLEM IN SMALL MISSILE APPLICATIONS. OUR PROPOSAL IS CHARACTERIZED BY TWO MAIN FEATURES, BOTH OF WHICH OFFER SIGNIFICANT POTENTIAL REDUCTION IN

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FIRING ENERGY. FIRST, WE PROPOSE TO USE MICROMACHINING TECHNIQUES TO BUILD AND ASSEMBLE MINIATURIZED, PRECISION-MACHINED DETONATOR COMPONENTS. SECONDLY, WE PROPOSE TO INVESTIGAGE BRIDGE MATERIALS WITH LOWER THERMODYNAMIC LOSSES THAN BOILING COPPER OR ALUMINUM, THE PREDOMINANT BRIDGE MATERIALS IN USE TODAY.

SOFTWARE ARCHITECTURE & ENGINEERING INC
1600 WILSON BLVD - STE 500
ARLINGTON, VA 22209
CONTRACT NUMBER:
GRADY H CAMPBELL JR
TITLE:
SOURCE CODE TAILORING
TOPIC# 104 OFFICE: NAVSEA IDENT#: 24812

A LONG-STANDING PROBLEM IN SOFTWARE ENGINEERNG IS AN INABILITY TO REUSE EXISTING, PROVEN SOFTWARE IN SIMILAR APPLICATIONS. WE ARE PROPOSING A PROVEN SOLUTION BASED ON THE USE OF A "META" PROGRAMMING TOOL, THAT WILL ALLOW THE DERIVATION OF PROGRAM SCHEMAS FROM EXISTING SOFTWARE AND CREATION OF NEW PROGRAMS FROM THOSE SCHEMAS. THE ESSENCE OF THIS APPROACH IS THAT EFFECTIVE REUSE REQUIRES PROGRAMMERS TO DESCRIBE HOW ANTICIPATED VARIANTS OF A PROGRAM CAN DIFFER. PROGRAM VARIANTS ARE VIEWED AS INSTANCES OF A SCHEMA (ABSTRACTION) THAT REPRESENTS A GENERALIZATION OF THE INSTANCES. THIS PROJECT WILL CONVEY THE PRINCIPLES OF METAPROGRAMMING AND DEMONSTRATE ITS FEASIBILITY FOR NAVY USE IN SHIPBOARD SOFTWARE DEVELOPMENT. AN OPERATIONAL SOFTWARE AE SCHEMA PROCESSOR WILL BE GENERALIZED TO ALLOW DERIVATION OF NAVY STANDARD LANGUAGE PROGRAMS FROM SCHEMAS OF EXISTING PROGRAMS.

SONALYSTS INC
PO BOX 280 - 215 PARKWAY N
WATERFORD, CT 06385
CONTRACT NUMBER:
LIVINGSTON DODSON
TITLE:
OPTICAL DISK STORAGE OF ENVIRONMENTAL DATA BASES
TOPIC# 117 OFFICE: NAVSEA IDENT#: 24928

SUBMITTED BY

THE OBJECTIVE IS TO USE THE MASSIVE STORAGE CAPABILITIES OF AN OPTICAL DISK TO 1) SUPPORT AN ENHANCED LEVEL OF PERFORMANCE WITH REGARD TO ENVIRONMENTAL DATA BASE STORAGE AND RETRIEVAL AND 2) BROADEN DATA BASE EMPLOYMENT CAPABILITIES, INCLUDING IMPROVED RESOLUTION AND INCREASED AMOUNTS OF DISPLAYED INFORMATION. THIS OBJECTIVE WILL BE ACCOMPLISHED DURING PHASE I BY IMPLEMENTING ENVIRONMENTAL DATA BASES ON AN OPTICAL DISK IN TWO FORMATS: GENERALIZED ENVIRONMENTAL MODEL (GEM) AND GRID, AND BY INVESTIGATING POTENTIAL APPLICATIONS OF THE DATA IN THESE TWO FORMATS FOR CONDUCTING VARIOUS ASPECTS OF TACTICAL DECISION MAKING. IN ADDITION A DISK MANAGEMENT AND UPDATE SYSTEM WILL BE DEVELOPED IN ORDER TO OPTIMIZE DISK USAGE.

SONALYSTS INC
PO BOX 280 - 215 PARKWAY N
WATERFORD, CT 06385
CONTRACT NUMBER:
DR JOHN M JAKACKY
TITLE:
THREE DIMENSIONAL ASW PERFORMANCE PREDICTION
TOPIC# 118 OFFICE: NAVSEA IDENT#: 24934

THE OBJECTIVE IS TO IDENTIFY METHODOLOGIES FOR DETERMINING THE OPTIMUM RADIALS AND DEPTHS FOR WHICH RANGE-DEPENDENT PROPAGATION LOSS CALCULATIONS ARE TO BE PERFORMED. THIS OBJECTIVE WILL BE ACHIEVED BY FIRST DEFINING REALISTIC ENVIRONMENTS UPON WHICH TO BASE THE ANALYSIS. FOLLOWING ENVIRONMENT SELECTION, RANGE-DEPENDENT PROPLOSS MODELS WILL BE RUN USING FINE MESH POINTS IN DEPTH AND ANGLE, AND OUTPUT DATA WILL BE STORED SUCH THAT PLOTS CAN BE MADE FOR VARIOUS CROSS SECTIONS OF THE FOUR DIMENSIONAL SPACE (PROPLOSS, RANGE, AZIMUTH, AND DEPTH). FOR EACH OF THE MULTIPLE RUNS, A SINGLE INDEPENDENT VARIABLE WILL VARY WHILE THE OTHERS ARE HELD CONSTANT. A COMPARISON OF PLOT BREAK POINTS WILL INDICATE THE SENSITIVITY OF VARYING EACH OF THE INDEPENDENT VARIABLES ON PROPLOSS. FROM THIS ANALYSIS, A SET OF "RULES" WILL BE DEVELOPED; THESE RULES WILL FORM THE BASIS FOR ESTABLISHING POSSIBLE METHODOLOGIES FOR DETERMINING OPTIMUM RADIALS AND DEPTHS.

SOVONICS SOLAR SYSTEMS
1100 W MAPLE RD
TROY, MI 48084
CONTRACT NUMBER:
DR JOSEPH HANAK
TITLE:
DEVELOPMENT OF PORTABLE ROOM-TEMPERATURE LOW-COST RADIATION DETECTORS
TOPIC# 172 OFFICE: NSWC IDENT#: 23855

SUBMITTED BY

THE GENERAL OBJECTIVE OF THIS PROPOSAL IS TO DEVELOP ENABLING TECHNOLOGY FOR A NEW TYPE OF RADIATION DETECTORS FOR CHARGED PARTICLES, NEUTRONS, X-RAY AND GAMMA RAYS AND CHARACTERIZED BY LIGHT WEIGHT, COMPACT SIZE, PORTABILITY, ROOM TEMPERATURE OPERATION, SUPERIOR RADIATION RESISTANCE AND TWO ORDERS OF MAGNITUDE LOWER COST COMPARED WITH EXISTING CRYSTALLINE GERMANIUM AND SILICON DETECTORS. THE SPECIFIC OBJECTIVE IS TO FABRICATE STACKED, MONOLITHIC, MULTI-JUNCTION, THIN-FILM AMORPHOUS SILICON ALLOY (a-Si) DEVICES DEPOSITED ON THIN, FLEXIBLE, STAINLESS STEEL FOILS BY EXISTING COMMERCIAL PROCESSES USED IN THE PRODUCTION OF SOLAR CELLS. THE DEVICES WILL UTILIZE STATE-OF-THE ART MATERIALS IN COMBINATION WILL ADVANCED DEVICE STRUCTURES. USE OF TEXTURED SUBSTRATES, DEPOSITION OF MULTI-JUNCTION SEMICONDUCTING a-Si LAYERS BY GLOW DISCHARGE TECHNIQUES, DEPOSITION OF FRONT ELECTRODES, PATTERNING AND FABRICATION OF RADIA-TION SENSOR STRUCTURES, AND TESTING THEM FOR DARK CURRENT AND FOR DETECTION OF INCIDENT CHARGED PARTICLE AND NEUTRON, X-RAY AND GAMMA RADIATION.

SPARTA INC
1055 WALL ST - STE 200
LA JOLLA, CA 92037
CONTRACT NUMBER:
JOEL M ZUIEBACK
TITLE:
INSENSITIVE MUNITIONS PROTECTIVE CONTAINERS
TOPIC# 205 OFFICE: NWC IDENT#: 23152

TECHNOLOGY HAS EVOLVED TO PRODUCE HIGH PERFORMANCE NAVY MUNITIONS. SUCH MUNITIONS CONTAIN MORE ENERGETIC PROPELLANTS AND WARHEATS (REFERRED TO HEREIN AS EXPLOSIVES) FOR MAXIMUM EFFECTIVENESS. THE IMPETUS FOR THIS DEVELOPMENT IS FLEET DEFENSE WHERE THERE IS A PAY-OFF FOR HIGHER THRUST/WEIGHT ROCKET MOROTS AND MORE LETHAL WARHEADS WHICH WILL RESULT IN MORE RANGE AND/OR LESS TIME-TO-TARGET AND INCREASED KILL PROBABILITY. HOWEVER, THERE IS AN INCREASED DETONA-TION HAZARD WHICH RESULTS IN HIGHER LEVELS OF RISK TO PERSONNEL AND EQUIPMENT REQUIRED TO TRANSPORT, STORE, AND HANDLE THE MUNITIONS. THE HIGHER HAZARD LEVELS MAY REDUCE THE BENEFITS ASSOCIATED WITH SHIPBOARD STORAGE. THIS PROJECT IS THE FIRST PHASE OF A MATERIALS

SUBMITTED BY

DEVELOPMENT PROGRAM TO PRODUCE HARDENED PROTECTIVE CONTAINERS FOR NAVY MUNITIONS STORED IN MAGAZINES ABOARD SHIP. THE OBJECTIVE OF THE PHASE I EFFORT IS TO (1) IDENTIFY HIGH PAY-OFF MATERIAL CONCEPTS, (2) DEVELOP MATERIAL DESIGN APPROACHES, (3) DEFINE TESTING REQUIREMENTS TO SUPPORT CONTAINER DESIGN AND (4) DEVELOP A PLAN FOR A PHASE II PROGRAM. THE PHASE II PROGRAM WILL UTILIZE THE MATERIAL DESIGN APPROACHES TO SELECT SPECIFIC MATERIALS, (2) DESIGN, FABRICATE AND TEST COUPON LEVEL AND PROTOTYPE ASSEMBLIES, AND (3) DEFINE THE REQUIREMENTS FOR FULL SCALE DEVELOPMENT.

SPARTA INC
1055 WALL ST - STE 200
LA JOLLA, CA 92038
CONTRACT NUMBER:
JOHN GLATZ
TITLE:
THERMAL MANAGEMENT OF EXCESS HEATING IN ELECTRONIC DEVICES
TOPIC# 96 OFFICE: NAVSEA IDENT#: 24767

SPARTA, INC. PROPOSES A PROGRAM TO ASSESS THE FEASIBILITY AND IMPLICATIONS OF USAGE OF ULTRA-HIGH THERMAL CONDUCTIVITY OF PITCH FIBERS IN THE DISSIPATION OF VERY HIGH HEAT LOADS BEING DEVELOPED IN THE ELECTRONIC OMPONENTS OF NAVY WEAPONS, SHIP AND SUBMARINE SYSTEMS. THERE ARE THREE INNOVATIVE MATERIAL DEVELOPMENT CONCEPTS IN THIS STUDY. FIRST, EVALUATION OF TWO AND THREE-DIMENSIONALLY REINFORCED HIGH THERMAL CONDUCTIVITY PITCH GRAPHITE FIBER WOVEN INTO A METAL MATRIX COMPOSITE HEATSINK. SECOND, EVALUATION OF METAL COATED HIGH CONDUCTIVITY FIBERS IN A RESIN MATRIX COMPOSITE. THIRD, EVALUATION OF THE DESIGN OF A COMPOSITE WITH ENCAPSULATED PHASE CHANGE MATERIAL FOR LOCAL ABSORPTION OF HIGH RAPID PULSED HEAT LOADS. THE FEASIBLE CONCEPTS(S) WILL BE EVALUATED IN A COMPUTER SUB ELEMENT FINITE ELEMENT MODEL OF A PRINTED CIRCUIT BOARD, FORMAT E MODULE AND ACTIVE COOLING SUPPORTS. THE PROGRAM WILL ALSO INCLUDE MANUFACTURE OF MANUFACTURE OF THE COMPITE. THE STUDY APPROACH IS A FOLLOWS: (1) ASSESSMENT OF SYSTEM REQUIREMENTS; (2) SELECTION OF CONSTITUENTS; (3) PARAMETRIC ANALYTICAL DESIGN OF COMPONENTS; (4) FABRICATION OF A TYPICAL COMPONENT; (5) TESTING OF THE COMPONENT; (6) ASSEMBLY OF A TECHNOLOGY DEVELOPMENT PLAN.

SPARTA INC
1104 CAMINO DEL MAR
DEL MAR, CA 92014
CONTRACT NUMBER:
STUART N ROSENWASSER
TITLE:
THE DEVELOPMENT OF BERYLLIDE INTERMETALLIC MATERIALS FOR HIGH PERFORMANCE NAVY MISSILE SYSTEMS
TOPIC# 102 OFFICE: NAVSEA IDENT#: 24798

SUBMITTED BY

BERYLLIDE INTERMETALLIC COMPOUNDS OFFER THE POTENTIAL TO ACHIEVE EXCEPTIONAL SPECIFIC MECHANICAL PROPERTIES IN THE 1000 TO 1500 C TEMPERATURE RANGE. THE OBJECTIVE OF THIS PROGRAM IS TO PERFORM THE NECESSARY SYSTEMS APPLICATIONS ANALYSES AND MATERIALS AND PROCESSES EVALUATIONS TO ASSESS THE FEASIBILITY AND POTENTIAL OF BERYLLIDES OR REINFORCED BERYLLIDES FOR ADVANCED NAVSEA MISSILE SYSTEMS. THE PROGRAM WILL FOCUS ON IDENTIFYING THE BERYLLIDE COMPOUNDS (s) THAT BEST MEET MISSSILE SYSTEM REQUIREMENTS AND EVALUATING THE SYNTHESIS AND PROCESSING METHODS, PURITY CONTROL AND MICROSTRUCTURE THAT WILL BE REQUIRED TO ACHIEVE THE NECESSARY STRENGTH AND TOUGHNESS FOR THESE APPLICATIONS. TASKS WILL INCLUDE ANALYSIS OF MISSILE APPLICATIONS AND REQUIREMENTS, SURVEY OF AVAILABLE BERYLLIDE PROPERTIES/ PROCESSING DATA, DETAILED CHEMICAL ANALYSIS AND MICROSTRUCTURE CHARACTERIZATION OF EXISTING ARCHIVE BERYLLIDE MATERIALS (INCLUDING EXPERIMENTAL ASSESSMENT OF REINFORCEMENT COMPATIBILITY); AND THE SELECTION OF CANDIDATE BERYLLIDES AND PROCESSING METHODS FOR DEVELOPMENT AND TESTING IN PHASE II. BASED ON THE RESULTS OF THIS WORK, A BERYLLIDE RESEARCH AND DEVELOPMENT PLANS, CONCENTRATING ON NAVSEA APPLICATIONS, WILL BE PREPARED.

SPARTA INC
23041 AVENIDA DE LA CARLOTA - STE 400
LAGUNA HILLS, CA 92653
CONTRACT NUMBER:
WALTER J ERNDT
TITLE:
LANGUAGE INDEPENDENT SOFTWARE ENGINEERING ENVIRONMENT
TOPIC# 106 OFFICE: NAVSEA IDENT#: 24845

OFTEN, THE STYLE AND SUBSTANCE OF A SOFTWARE DEVELOPMENT EFFORT IS TIED TO THE PROGRAMMING LANGUAGE USED TO IMPLEMENT THE TARGET SYSTEM. MOREOVER, THE GROWING POPULARITY OF PROGRAMMING LANGUAGES ROOTED IN A VARIETY OF DIFFERING SOFTWARE ENGINEERING PRINCIPLES SUCH ADA, LISP AND SMALTALK HAS INCREASED DEVELOPER INCLINATION INCORPORATED LANGUAGE SPECIFIC CAPABILITIES EARLY IN THE DESIGN LIFECYCLE. WHILE THERE ARE OFTEN ADVANTAGED TO BE GAINED BY LANGUAGE SPECIFIC APPROACHES, MANY LANGUAGES WERE DESIGNED WITH SPECIFIC PROBLEM DOMAINS IN MIND (E.G. EMBEDDED REAL-TIME SYSTEMS <-> ADA, SYMBOLIC PROCESSING

SUBMITTED BY

<-> SPEED AND EFFICIENCY). IT IS OFTEN UNWISE TO PRECLUDE THE USE A VARIETY OF LANGUAGES IN A SINGLE DEVEOPMENT LIKELY TO ENCOUNTER A LARGE AND VARIED PROBLEM DOMAIN. AN ENVIRONMENT IS PROPOSED THAT WILL PROVIDE AN OBJECT ORIENTED, GRAPHICALLY DRIVEN METHOD FOR SPECIFYING, DESIGNING, SIMULATING, AND MANAGING SOFTWARE DEVEOPMENT. THE PHASE I EFFORT WILL ESTABISH THE REQUIREMENTS FOR SUCH A ENVIRONMENT, ADDRESSING ALL PHASES OF THE SOFTWARE LIFECYCLE, AND DETERMINING THOSE AREAS WHERE LANGUAGE INDEPENDENCE WILL HAVE A KEY EFFORT ON THE METHODOLOGY.

SPIRE CORP
PATRIOTS PK
BEDFORD, MA 01730
CONTRACT NUMBER:
DR KURT J LINDEN
TITLE:
LASER DIODE ARRAYS
TOPIC# 69 OFFICE: NAVAIR IDENT#: 24479

THIS PROPOSAL DEALS WITH THE DESIGN OF HIGH PULSED POWER DIODE LASER ARRAYS AND THE DEVELOPMENT OF FABRICATION TECHNIQUES FOR ACHIEVING SUCH ARRAYS. DURING THE FIRST PART OF THIS PHASE I EFFORT WE WILL CRITICALLY REVIEW EXISTING DESIGNS OF EDGE-EMITTING AND SURFACE-EMITTING LASER ARRAYS. THERE HAS BEEN AN EVER-INCREASINGLY RAPID RATE OF DIODE LASER ARRAY DEVELOPMENTS IN RECENT YEARS, STIMULATED IN LARGE PART BY THE SUCCESSFUL ACHIEVEMENT OF THE QUANTUM WELL (QW) LASER, WITH ITS INHERENT SUPERIORITY IN TERMS OF THRESHOLD CURRENT, OUTPUT POWER, AND TEMPERATURE DEPENDENCE. SPIRE WILL WORK CLOSELY WITH THE NAVY AND ORDNANCE MANUFACTURERS TO EXPLORE LASER ARRAY DESIGNS BEST SUITED FOR THE REQUIRED PURPOSES. AS THE MOST IMPORTANT PART OF THIS PHASE I PROGRAM, SPIRE WILL DESIGN AN ARRAY BEST SUITED FOR ACHIEVING REQUIRED OBJECTIVES OF HIGH PEAK PULSED POWER. RECENT DEVELOPMENTS IN HIGH POWER SURFACE-EMITTING, MULTIPLE QUANTUM WELL (MQW) LASERS INDICATE THAT THIS TECHNOLOGY MAY BE IDEALLY SUITED FOR THIS PURPOSE, AND WE INTEND TO EXPLORE THIS TECHNOLOGY IN GREAT DETAIL. THE MOCVD EPITAXIAL LAYER GROWTH TECHNOLOGY, FOR WHICH SPIRE HAS A WORLD-WIDE REPUTATION OF ACHIEVEMENT, WILL FORM THE BASIS OF THE PROPOSED PROGRAM. LASER ARRAY DESIGNS WILL BE COMPATIBLE WITH THIS TECHNOLOGY. SOME PRELIMINARY LASER ARRAY FABRICA-

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TION STUDIES RELATED TO THE ARRAY DESIGN WILL ALSO BE CARRIED OUT. THE PHASE I EFFORT WILL BE CARRIED OUT WITH THE OBJECTIVE OF UTILIZING A PHASE II PROGRAM TO IMPLEMENT THE DESIGN PARAMETERS DEVELOPED DURING PHASE I.

SPIRE CORP
PATRIOTS PK
BEDFORD, MA 01730
CONTRACT NUMBER:
DR PIRAN SIOSHANSI
TITLE:
LOW CYCLE FATIGUE ENHANCEMENT BY ION IMPLANTATION
TOPIC# 236 OFFICE: NAPC IDENT#: 25244

ION IMPLANTATION IS AN EFFECTIVE PROCESS TO CREATE COMPRESSIVE STRESS IN THE SUBSURFACE REGIONS OF METALLIC COMPONENTS AND THEREBY ENHANCE THEIR RESISTANCE TO FATIGUE INITIATED FAILURES. ION IMPLANTATION OF LIGHT INTERSTITIAL IONS (SUCH AS BORON, CARBON OR NITROGEN) INTO TITANIUM-BASED ALLOYS (OR FERROUS ALLOYS) IS A MICROSCOPIC SHOT PEENING PROCESS THAT CREATES TREMENDOUS COMPRESSIVE STRESS ON THE SURFACE OF TREATED COMPONENTS. THE COMPRESSIVE STRESS IS THE UNDERLYING REASON FOR THE SLOWDOWN IN THE CRACK INITIATION PHASE AND CRACK PROPAGATION MODE. IN ADDITION THE PROCESS HAS BEEN SHOWN TO BE VERY EFFECTIVE TO MINIMIZE GALLING (ESPECIALLY IN TITANIUM BASED ALLOYS) AND NOTCH CREATION IN HANDLING OF TITANIUM ALLOYS THAT CAN GIVE RISE TO FATIGUE FAILURE.

SPS SOFTWARE PRODUCTS & SERVICES INC
14 - E 38TH ST/14TH FL
NEW YORK, NY 10016
CONTRACT NUMBER:
PETER LEMPP
TITLE:
EXPERT ASSISTANT FOR STRUCTURED SOFTWARE DEVELOPMENT
TOPIC# 148 OFFICE: NWSC IDENT#: 23673

SPS SHALL UNDERTAKE AND R&D EFFORT TO INVESTIGATE THE FEASIBILITY

SUBMITTED BY

AND EFFECTIVENESS OF AN "INTELLIGENT EXPERT ASSISTANT" WHICH APPLIES EXPERT SYSTEM TECHNOLOGY IN CONJUNCTION WITH COMPUTER-AIDED SOFTWARE ENGINEERING (CASE) TOOLS FOR STRUCTURED SOFTWARE DEVELOPMENT. THE RESEARCH OBJECTIVE IS TO SHOW THAT HIGHER-QUALITY, FASTER, AND MORE EFFICIENT SOFTWARE DEVELOPMENT IS ACHIEVABLE WITH AN EXPERT SYSTEM ACTIVELY GUIDING THE DEVELOPERS, BASED ON DESIGN METHOD-DEPENDENT KNOWLEDGE (ADDITIONALLY UTILIZING APPLICATION-DEPENDENT KNOWLEDGE AND/OR KNOWLEDGE ABOUT ALREADY EXISTING SOFTWARE SOLUTIONS). A FURTHER PROJECT OBJECTIVE IS TO SHOW THAT THIS MORE STEADY AND RELIABLE SOFTWARE DEVELOPMENT CAN EVEN BE ACCOMPLISHED WITH LESS DEPENDENCE ON THE BACKGROUND AND EXPERIENCE OF THE INDIVIDUAL DESIGNER. THE PROJECT WILL DEFINE A PLATFORM OF SUITABLE CASE TOOLS AND EXPERT SYSTEM SHELLS, AND WILL DETERMINE SIGNIFICANT ASPECTS OF AN EXPERT SYSTEM CAPABLE OF SELECTING APPROPRIATE DESIGN METHODS AND PROVIDING ADVISORY SUPPORT THROUGHOUT THE SOFTWARE DEVELOPMENT PROJECT ACCORDING TO THE SUITABLE METHOD.

SRS TECHNOLOGIES
990 EXPLORER BLVD NW
HUNTSVILLE, AL 35806
CONTRACT NUMBER:
JOHN F RICE
TITLE:
AN OPTIMIZED METHOD FOR APPLICATION OF COLOR TO MISSION DISPLAYS OF THE E-2C
TOPIC# 72 OFFICE: NAVAIR IDENT#: 24514

AS THE MISSION DISPLAYS OF MILITARY SYSTEMS BECOME MORE COMPLEX, IT BECOMES NECESSARY TO IMPLEMENT MORE EFFECTIVE MEANS OF PRESENTING MISSION INFORMATION TO OPERATORS. AS A RESULT, MANY OF THESE DISPLAYS HAVE BEEN UPGRADED FROM MONOCHROME TO MULTI-COLOR UNITS. THIS IMPROVEMENT HAS PROMPTED THE REQUIREMENT FOR EFFECTIVE, STRUCTURED APPLICATION OF COLOR TO DISPLAY OBJECTS. THE ENHANCED MAIN DISPLAY UNIT OF THE E-2C IS INCLUDED IN THE CATEGORY OF DISPLAYS UPGRADED TO MULTI-COLOR. SINCE THE UNIT PROVIDES A LARGE QUANTITY AND VARIETY OF COMMAND, CONTROL, AND COMMUNICATIONS INFORMATION, IT IS IMPORTANT THAT COLOR APPLICATION BE OPTIMIZED. A STRUCTURED COLOR APPLICATION METHODOLOGY IS PRESENTED FOR PERFORMING REQUIREMENTS STUDIES FOLLOWED BY PARAMETER MATRIXING. THE MATRIX APPROACH

SUBMITTED BY

PROVIDES THE MEANS TO MATCH RECOMMENDED COLOR SCHEMES TO DISPLAY OBJECTS.

STAR MICROWAVE
540 DIVISION ST
CAMPBELL, CA 95008
CONTRACT NUMBER:
ROBERT M PHILLIPS
TITLE:
RESEARCH LEADING TO A SECOND GENERATION LCX TRAVELING WAVE TUBE
TOPIC# 19 OFFICE: ONT IDENT#: 26312

THE OBJECTIVE OF THIS PROJECT IS TO DEMONSTRATE AND VALIDATE DESIGNS AND FABRICATION TECHNIQUES WHICH WILL LEAD TO A SECOND GENERATION IJ BAND PULSED LCX (LOW COST EXPENDABLE) TWT WHICH CAN BE MADE TO SELL FOR UNDER $2500. LOW COST FEATURES INCLUDE AN OXIDE CATHODE IN A GUN WHICH IS BASED ON A CRT TYPE OF MECHANICAL DESIGN AND CONSTRUCTION, USING CRT PARTS; LONG PERIOD FOCUSING, WHICH REDUCES FOCUSING CIRCUIT PART COUNT BY A FACTOR OF 3 OR MORE, AND A NEW SIMPLIFIED APPROACH TO ACHIEVING A TIGHT FIT BETWEEN THE BARREL AND CIRCUIT BUNDLE. ALSO TO BE INVESTIGATED ARE LOW COST SPUTTER COATINGS FOR CIRCUIT ATTENUATION AND LOW COST FABRICATION FOR PRODUCING THE DISPERSION SHAPING RAILS USED IN THE FIRST GENERATION LCX.

STRATEGIC ANALYSIS INC
1725 JEFFERSON DAVIS HWY - STE 200
ARLINGTON, VA 22202
CONTRACT NUMBER:
BRADFORD L SMITH JR
TITLE:
INTELLIGENT RDT&E MANAGEMENT INFORMATION SYSTEMS
TOPIC# 10 OFFICE: ONT IDENT#: 23451

THIS PROPOSAL IS TO CREATE A PROTOTYPE INTELLIGENT RDT&E MANAGEMENT INFORMATION SYSTEMS USING ARTIFICIAL INTELLIGENCE TECHNIQUES, IBM-PC'S AND COMMERCIALLY AVAILABLE SOFTWARE. THE SPECIFIC TECHNICAL OBJECTIVE OF THIS EFFORT IS TO CREATE PROTOTYPE NETWORK STRUCTURE

SUBMITTED BY

SUITABLE FOR EXPERT SYSTEM DEVELOPMENT, DEMONSTRATE PROBLEM SOLVING PROCEDURES USING THIS NETWORK STRUCTURE, AND ASSESS THE FEASIBILITY OF THIS APPROACH FOR LARGER INFORMATION MANAGEMENT SYSTEMS.

STRUCTURAL COMPOSITES INC
PO BOX 1300
MELBOURNE, FL 32902
CONTRACT NUMBER:
JOSEPH J SEIDLER
TITLE:
ATMOSPHERIC EFFECTS ON FIBER REINFORCED PLASTIC MATERIALS IN SUBMARINE ENVIRONMENT
TOPIC# 73 OFFICE: NAVSEA IDENT#: 24635

FRP MATERIALS ARE USE TO PRODUCE LIGHTWEIGHT, HIGH STRENGTH STRUCTURES WITH EXCELLENT DAMPING, NOISE REDUCTION, AND CORROSION RESISTANT PROPERTIES WHICH MAKE THEM ATTRACTIVE FOR USE IN SUBMARINES. THIS RESEARCH WILL INVESTIGATE POTENTIAL ATMOSPHERIC EFFECTS WHICH MIGHT RESULT FROM FRP USE. SEVERAL CANDIDATE FRP MATERIALS WILL BE USED FOR OUTGASSING AND COMBUSTION EXPERIMENTS AND THE DETERMINATION OF COMBUSTION HEAT GENERATION RATES. THE COMPOSITION AND RELATIVE MAGNITUDE OF GAS AND PARTICULATE EMISSIONS WILL BE DETERMINED USING GAS CHROMATOGRAPHY. RECOMMENDATIONS WILL BE PRESENTED FOR FRP USE AND ASSESSMENT OF FUTURE MATERIALS. ANTICIPATED RESULTS SHOULD INDICATE THE NEWLY MANUFACTURED FRP MATERIALS PRODUCE LOW LEVEL EMISSIONS OF VOLATILE ORGANIC COMPOUNDS WHICH SUBSIDE OVER TIME. AT ELEVATED TEMPERATURES, THE RATE OF OUTGASSING IS EXPECTED TO BE HIGHER. THIS EFFECT MAY BE USED IN DEVELOPING A PRETREATMENT PROCESS TO REMOVE VOLATILE COMPONENTS FROM NEW FRP CONSTRUCTIONS. FRP MATERIALS BASED ON GLASS FIBER AND EPOXY ARE EXPECTED TO EXHIBIT THE LOWEST POTENTIAL FOR ATMOSPHERIC CONTAMINATION AND MAY BE THE MOST FEASIBLE FOR INTERNAL SUBMARINE USE.

STRUCTURED TECHNOLOGY CORP
PO BOX 480 - 222 FLANDERS RD
NIANTIC, CT 06357
CONTRACT NUMBER:
RONALD D FLIGHT
TITLE:
THREE DIMENSIONAL ASW PERFORMANCE PREDICTION
TOPIC# 118 OFFICE: NAVSEA IDENT#: 24935

SUBMITTED BY

AN ALGORITHM WILL BE DEVELOPED TO SELECT OPTIMUM RADIALS AND DEPTHS FOR PROPAGATION LOSS COMPUTATIONS. THE ALGORITHM WILL BE RESULTANT FROM A SERIES OF TESTS RUN TO IDENTIFY THE CRITICAL COMPONENTS OF RANGE DEPENDENT PROPAGATION LOSS MODELS AND THE CONDITIONS IN WHICH THESE VARIOUS FACTORS SIGNIFICANTLY AFFECT THE CALCULATION OF PROPAGATION LOSS. THE FIRST STEP IS TO SELECT ENVIRONMENTAL CONDITIONS THAT REPRESENT REALISTIC VARIATIONS IN THE ENVIRONMENT OVER RANGE AND BEARING. NEXT, THE MODIFICATIONS OF TEST CASES WILL BE USED TO VALIDATE ALL COMPONENT PARTS OF CURRENT PROPAGATION LOSS MODELS AND TO ADDRESS RANGE DEPENDENT PROPAGATION LOSS MODELING. THE NEW ALGORITHM WILL TAKE INTO ACCOUNT VARIOUS ENVIRONMENTAL PARAMETERS AND WILL BE TESTED WITH VARYING ENVIRONMENTAL CONDITIONS.

SUMMIT RESEARCH CORP
1 - W DEER PARK DR
GAITHERSBURG, MD 20877
CONTRACT NUMBER:
MONTE BLACKSBERG
TITLE:
AIR ASW ACOUSTIC PROCESSOR OPERATOR DECISION AIDS
TOPIC# 60 OFFICE: NAVAIR IDENT#: 24448

THE ADVANCED MULTI-MODE/MULTI-VERNIER AN/AQA-7(V)10/11 AND AN/UYS-1 ACOUSTIC SIGNAL PROCESSORS PROVIDE AN ALMOST UNLIMITED NUMBER OF MODE SELECTION AND VERNIER SELECTION/PLACEMENT OPTIONS. THIS WIDE DIVERSITY OF PROCESSOR CONFIGURATION OPTIONS THUS ALLOWS THE OPERATOR TO TAILOR THE SET-UP OF HIS EQUIPMENT TO MAXIMIZE ACOUSTIC DETECTION PERFORMANCE FOR EACH TACTICAL SITUATION, THREAT(S) SCENARIO, AND SET OF ENVIRONMENTAL CONDITIONS ENCOUNTERED DURING AN ASW MISSION. HOWEVER, HIGH OPERATOR WORK LOADS DURING CRITICAL TACTICAL EVOLUTIONS, INEXPERIENCE, INADEQUATE TRAINING, AND/OR LACK OF READY ACCESS TO ESSENTIAL DATA LIMIT THE CAPABILITY OF OPERATORS TO OPTIMIZE THE CONFIGURATION OF THE PROCESSOR TO MAXIMIZE ACOUSTIC DETECTION PERFORMANCE. THIS PROPOSED EFFORT WILL DETERMINE THE FEASIBILITY OF EXTENDING TECHNIQUES, ALGORITHMS AND LOGIC DEVELOPED TO PROVIDE ON-BOARD DECISION AIDS FOR THE EMPLOYMENT OF TOWED ARRAY SONARS TO THE EMPLOYMENT OF ADVANCED MULTI-MODE/MULTI-VERNIER ACOUSTIC SIGNAL PROCESSING IN ASW AIRCRAFT. THE RESULT OF THIS

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EFFORT WILL BE A DETAILED DESIGN FOR A FAST-RUNNING, ACCURATE ON-BOARD MODE SELECTION (OBMS) SOFTWARE PACKAGE CAPABLE OF PROVIDING THE PROCESSOR MODE SELECTION/VERNIER SELECTION/PLACEMENT ADVISORIES FOR ALL TACTICAL SITUATIONS, THREAT(S) SENSOR COMBINATIONS, AND ENVIRONMENTAL CONDITIONS ENCOUNTERED DURING AN ASW MISSION.

SYNERGEN INC
1885 - 33RD ST
BOULDER, CO 80301
CONTRACT NUMBER:
DR CHARLES H HANNUM
TITLE:
A HUMAN IL-1 INHIBITOR FOR THE TREATMENT OF SEPTIC SHOCK
TOPIC# 59 OFFICE: NMRDC IDENT#: 22452

WE PROPOSE TO PURIFY AN IL-1 INHIBITOR FROM THE SUPERNATANT OF MONOCYTES CULTURED ON PLATES COATED WITH IgG. THIS INHIBITORY ACTIVITY HAS BEEN SHOWN TO BE ABOUT 22 KILODALTONS IN MOLECULAR WEIGHT AND TO INHIBIT IL-1 IN SEVERAL ASSAYS, NAMELY IL-1 MEDIATED THYMOCYTE PROLIFERATION, COLLAGENASE RELEASE BY ARTICULAR CHONDROCYTES, AND PGE(2) RELEASE BY BOTH SYNOVIAL AND DERMAL FIBRO-BLASTS. WE WILL PRODUCE LARGE QUANTITIES OF THE INHIBITOR-CONTAINING SUPERNATANT AND PURIFY THE PROTEIN BY CONVENTIONAL CHROMATOGRAPHIC TECHNIQUES. INITIALLY WE WILL USE THE THYMOCYTE-PROFILERATION ASSAY TO MONITOR PURIFICATION BUT WILL IMMEDIATELY BEING DEVELOPING A FASTER PGE(2)-RELEASE ASSAY TO SPEED UP PURIFICATION. WE ALSO WILL BEGIN DEVELOPING MONOCLONAL ANTIBODIES TO THIS MOLECULE. OUR PHASE-I GOALS ARE TO DEVELOP A RAPID ASSAY FOR THIS INHIBITOR AND TO ATTAIN A 400-FOLD PURIFICATION.

SYNETICS CORP
540 EDGEWATER DR
WAKEFIELD, MD 01880
CONTRACT NUMBER:
J ORGAN
TITLE:
ADVANCED INFORMATION DISPLAY TECHNIQUES
TOPIC# 130 OFFICE: NSWC IDENT#: 23535

SUBMITTED BY

THIS PROJECT WILL CONCEPTUALIZE UNIQUE ADVANCED INFORMATION DISPLAYS TO SUPPORT TACTICAL DECISION MAKING IN A SHIPBOARD ENVIRONMENT, AND DETERMINE THE FEASIBILITY OF IMPLEMENTING THE DISPLAYS IN REAL-TIME USING DATA REPRESENTATIVE OF THAT RESIDENT IN SHIPBOARD DATA BASES AND SENSOR SYSTEMS. COMPUTER PROGRAMS TO IMPLEMENT THE DISPLAY ALGORITHMS WILL BE DESIGNED TO BE COMPATIBLE WITH A STANDARD NAVY DESK TOP COMPUTER. A TACTICAL SCENARIO REQUIRING RAPID DECISIONS BASED ON UNCERTAIN OR INCOMPLETE INFORMATION WILL BE CREATED. INTERACTIVE VIDEO DISPLAYS TO ASSIST THE SHIP IN IDENTIFYING AND SELECTING THE "BEST" COURSE OF ACTION FROM AMONG SEVERAL PLAUSIBLE ONES WILL BE CONCEPTUALIZED. MATHEMATICAL MODELS UTILIZING VARIABLES AND DATA CHARACTERISTICS OF A SHIPBOARD CONFLICT ENVIRONMENT WILL BE CONSTRUCTED AND TRANSFORMED INTO ALGORITHMS EXECUTABLE ON A STANDARD NAVY DESKTOP COMPUTER. A PROTOTYPE COMPUTER PROGRAM WILL BE DEVELOPED TO DEMONSTRATE PROOF OF CONCEPT AND PROVIDE THE BASIS FOR A PHASE II FULL-SCALE DEVELOPMENT EFFORT.

SYNETICS CORP
540 EDGEWATER DR
WAKEFIELD, MA 01880
CONTRACT NUMBER:
ILAN GONEN
TITLE:
EMBEDMENT OF SAFENET LAN INTO THE NAVAL TACTICAL STANDARD DESKTOP COMPUTER
TOPIC# 47 OFFICE: SPAWAR IDENT#: 24438

SINCE THE ORIGINAL NAVAL TACTICAL STANDARD DESKTOP COMPUTER (NTSDTC) CONTRACT AWARD IN 1983, THE OPERATIONAL USE OF THE NTSDTC HAS GROWN FROM A STAND-ALONE TACTICAL DECISION AID COMPUTER INTO THE MULTI-COMPUTER JOINT OPERATIONAL TACTICAL SYSTEM (JOTS). THE CURRENT JOTS/NTSDTC COMPUTER IS THE HP-9020 SERIES. IN SPITE OF THE IMPRESSIVE PROCESSING POWER OF THIS DESKTOP COMPUTER, FLEET COMMANDERS HAVE CITED REQUIREMENTS FOR EVEN GREATER PROCESSING SPEED. THE NAVY IS CURRENTLY IN THE PROCESS OF PROCURING AN UPGRADED REPLACEMENT FOR THE HP-9020, AND AN EMBEDMENT OF LAN CONTROLLERS INTO THE NTSDTC IS THE SUBJECT OF THIS SBIR RESEARCH TOPIC. DURING PHASE-I, SYNETICS PROPOSES TO DEVELOP THE HP-9020 EMBEDDED LAN BOARDS FOR BOTH

SUBMITTED BY

SAFENET-I AND SAFENET-II STANDARDS, DEFINED BY THE U.S. NAVY'S LAN STANDARDIZATION COMMITTEE. EACH OF THESE GATEWAYS WILL INTERFACE WITH A DUAL-REDUNDANT LAN USING A SINGLE CARD, AND AN OPTIONAL SECOND IDENTICAL GATEWAY CARD CAN BE USED TO INTERFACE THE NTSDTC WITH A QUAD-REDUNDANT LAN (TWO SETS OF COUNTER-ROTATING RINGS). THE TRANSITION FROM THE HP-9020 TO ANY NEW COMPUTER WHICH MIGHT BE SELECTED FOR THE NEXT GENERATION NTSDTC WILL BE GREATLY FACILITATED BY THE SYNETICS' MODULAR DESIGN APPROACH.

SYNTECH MATERIALS INC
PO BOX 5242
SPRINGFIELD, VA 22150
CONTRACT NUMBER:
JAMES D MIESSLER
TITLE:
COST REDUCTION APPROACHES FOR MULTI-PHASE SYNTACTIC FOAM ANECHOIC MATERIALS
TOPIC# 161 OFFICE: NSWC IDENT#: 23766

A PROGRAM IS PROPOSED WHEREIN THE VARIOUS COST FACTORS INVOLVED IN THE MANUFACTURE OF A PARTICULAR CLASS OF COMPOSITE MATERIALS ARE TO BE SIGNIFICANTLY REDUCED, THUS PERMITTING ITS MORE WIDESPREAD USE WITHIN THE NAVAL COMMUNITY. THE CLASS OF MATERIALS OF INTEREST CONSISTS OF SYNTACTIC FOAM, WITH A VARIETY OF INCLUSION MATERIALS AND GEOMETRIES. THE PROGRAM WILL EVALUATE THREE PRIMARY COST REDUCTION APPROACHES: (1) RAW MATERIAL COST, (2) TOOLING COSTS, AND (3) REDUCED LABOR COSTS. ACTUAL ACOUSTIC MEASUREMENTS WILL BE PERFORMED BY THE NAVAL SURFACE WARFARE CENTER, FOR REASONS DESCRIBED IN THE BODY OF THIS PROPOSAL.

SYNTEK ENGINEERING & COMPUTER SYS INC
3255 WING ST - STE 550
SAN DIEGO, CA 92110
CONTRACT NUMBER:
DR A G DILORETO
TITLE:
BATTLE DAMAGE ASSESSMENT FOR ANTI-SHIP WARFARE
TOPIC# 182 OFFICE: NSWC IDENT#: 23899

SUBMITTED BY

THIS EFFORT DEVELOPS THE STRUCTURE FOR A PROTOTYPE COMPUTER BASED BATTLE DAMAGE ASSESSMENT SYSTEM FOR THE IBM-PC/AT AND HP9020A THAT PROVIDES A RAPID ESTIMATE OF DAMAGE TO ENEMY SURFACE SHIPS HIT BY U.S. NAVY WEAPONS LAUNCHED BY SURFACE, AIR, OR SUBMARINE ATTACK UNITS. THE SYSTEM SYNERGISTICALLY COMBINES DATA INPUTS FROM VARIOUS SENSORS AND RECONNAISSANCE REPORTS FOR EACH TARGET IDENTIFIED AND TAKEN UNDER FIRE. USING A COMPARISON OF THE REPORTED HITS ACHIEVED WITH WEAPON EFFECTIVENESS MANUALS AND THE OTC'S DESIRED LEVEL OF DAMAGE TO THE ENEMY SHIPS, IT REPORTS THE SUCCESS OF THE STRIKE IN TERMS OF IMPAIRMENT ACHIEVED OF EACH TARGET. INCLUDED IN THE REPORT IS THE CONFIDENCE LEVEL OF THE RESULTS.

SYSTEMS & PROCESSES ENGINEERING CORP
1406 SMITH RD - STE A
AUSTIN, TX 78721
CONTRACT NUMBER:
DR N B PENROSE
TITLE:
ON-LINE REAL TIME RHEOMETER
TOPIC# 156 OFFICE: NSWC IDENT#: 23720

THIS PROJECT DEVELOPS AN ON-LINE RHEOMETER APPLYING THE PRINCIPLES OF THE HAGAN-POISEULLE EQUATION. THE RHEOMETER IS DESIGNED TO MEASURE ACCURATELY THE VISCOSITY OF MUNITION PROPELLANTS BEING EXTRUDED BY A TWIN-SCREW EXTRUDER. THE PROPELLANT EXTRUDATE IS A PSEUDOPLASTIC FLUID CONTAINING SUSPENDED SOLIDS. THE POISEULLE METER IS AN ACCURATE RHEOMETER FOR PSEUDOPLASTIC EXTRUDATES AND CAN BE IMPLEMENTED AS AN ON-LINE DEVICE. THIS PROPOSED RESEARCH PROGRAM ALSO DEVELOPS A PRELIMINARY CONTROL STRATEGY USING THE POISEULLE METER FOR FEED-BACK CONTROL AT THE EXTRUDER.

SYSTEMS PLANNING & ANALYSIS INC
5111 LEESBURG PIKE - STE 200
FALLS CHURCH, VA 22041
CONTRACT NUMBER:
JOHN G BURTON
TITLE:
MULTI-WARFARE ASSESSMENT PLANNING AND DEVELOPMENT
TOPIC# 44 OFFICE: SPAWAR IDENT#: 24431

SUBMITTED BY

SPA PROPOSES TO SUPPORT SPAWAR WITH MULTI-WARFARE ASSESSMENT PLANNING AND DEVELOPMENT. FIRST SPA WILL ANALYZE THE NAVY'S ARCHITECTURE AND PLANNING PROCESSES TO DETERMINE ALL REQUIREMENTS THAT SHOULD BE FILLED BY MULTI-WARFARE ASSESSMENT. THE MULTI-WARFARE ASSESSMENT USED TO FILL THE REQUIREMENTS WILL BE AS DEFINED BY NAVAL SPACE AND WARFARE SYSTEMS COMMAND (SPAWAR) AND IMPLEMENTED BY SPA'S PROPOSED DEVELOPMENT. THE MULTI-WARFARE ASSESSMENT DEVELOPED BY SPA WILL BE BASED ON THE REQUIREMENTS AND THE AVAILABLE RESOURCES; IT WILL BE A COMPREHENSIVE PROCESS, FULLY SUPPORTING DEVELOPMENT OF NECESSARY REQUIREMENTS DOCUMENTS, ARCHITECTURE PRODUCTS, AND WARFARE APPRAISALS; AND ITS FEASIBILITY WILL BE FULLY ASSESSED. SPA WILL COMPLETE PLANS FOR IMPLEMENTATION OF THE MULTI-WARFARE ASSESSMENT AND ITS INTEGRATION WITH THE NAVY ARCHITECTURE AND PLANNING PROCESSES. THESE PLANS WILL BE INCLUDED THE ASSESSMENT'S IMPACT ON SPAWAR'S ARCHITECTURE PLANNING SCHEDULE, ITS PRESENTATION TO THE NAVAL PLANNING COMMUNITY, AND THE ROLE OF EACH LABORATORY AND SYSTEMS COMMAND IN FUTURE EXPANDED WARFARE ANALYSIS.

SYSTEMS SUPPORT INC
10024 COLVIN RUN RD
GREAT FALLS, VA 22066
CONTRACT NUMBER:
CARL BOYARS
TITLE:
INSENSITIVE MUNITIONS BY CHEMICAL MEANS
TOPIC# 97 OFFICE: NAVSEA IDENT#: 24771

ALL DOD COMPONENTS, AND THE NAVY IN THIS PARTICULAR CASE, HAVE A NEED FOR MUNITIONS WHICH RESIST INITIATION EXCEPT IN THE NORMAL CIRCUMSTANCES OF USAGE. MUCH WORK HAS BEEN DONE IN PREVIOUS YEARS, SOME APPLICABLE AND SOME NOT APPLICABLE. PRESENT RESULTS MUST BE SCREENED. THE POTENTIAL OF CRYSTALLINE EXPLOSIVE COMPOUNDS, SOLID SOLUTION EXPLOSIVES, IMPACT-ENERGY-ABSORBING BINDERS, HEAT SINK INGREDIENTS, STABLE AND INSENSITIVE OXIDIZERS AND PLASTICIZERS, ENCAPSULATIONS, AND COATINGS WILL BE EVALUATED. RECOMMENDATIONS WILL BE MADE FOR FRUITFUL R&D.

TACAN CORP
2111 PALOMAR AIRPORT RD
CARLSBAD, CA 92009
CONTRACT NUMBER:
DR ERNEST M KIM
TITLE:
HIGH PERFORMANCE OPTICAL IMAGE PROCESSOR
TOPIC# 138 OFFICE: NSWC IDENT#: 23590

SUBMITTED BY

OPTICAL IMAGE PROCESSING USING NEURAL NETWORK CONCEPTS SHOW PROMISE IN THOSE APPLICATIONS REQUIRING REAL TIME TARGET DETECTION, AND CLASSIFICATION. IN PARTICULAR, THE PRINCIPLES OF OPTICAL BIDIRECTIONAL ASSOCIATIVE MEMORIES (BAMs) FOR HETEROASSOCIATIVE PROCESSING EXHIBITS ALL OF THE CHARACTERISTICS REQUIRED FOR THOSE APPLICATIONS WHERE CONVENTIONAL DIGITAL COMPUTERS HAVE BEEN SHOWN TO BE INADEQUATE. WE PROPOSE TO DESIGN AN OPTICAL BAM FOR REAL TIME OPTICAL IMAGE PROCESSING AND CLASSIFICATION APPLICATIONS WITH THE USE OF HOLOGRAPHIC MEMORY AND PHASE CONJUGATE OPTICS.

TACAN CORP
2111 PALOMAR AIRPORT RD - STE 100
CARLSBAD, CA 92009
CONTRACT NUMBER:
DONALD THOMPSON
TITLE:
COMPARATIVE ANALYSIS TECHNIQUES FOR INTERPROCESS COMMUNICATION DESIGN FOR A DISTRIBUTED REAL-TIME ENVIRONMENT
TOPIC# 184 OFFICE: NSWC IDENT#: 23906

IN THIS PROPOSED EFFORT, INTERPROCESS COMMUNICATION (IPC) TECHNIQUES ARE EVALUATED IN THE CONTEXT OF A THREE-TIERED DISTRIBUTED SYSTEM ARCHITECTURE DESIGNED FOR REAL-TIME APPLICATIONS. THE PROPOSED WORK WILL YIELD A HIGH-LEVEL ARCHITECTURAL DESIGN AND A MODEL FOR EVALUATION OF IPC TECHNIQUES. THE MODEL MAY BE USED FOR EVALUATION OF EXISTING OR ENVISIONED IPC SCHEMES.

TECHNAUTICS INC
727 - S 23RD ST
ARLINGTON, VA 22202
CONTRACT NUMBER:
THOMAS L VAN DER LINDEN
TITLE:
COMPUTERIZED REQUIREMENTS FOR EXPEDITING RFP ACTIONS AND CONTRACT DOCUMENTATION
TOPIC# 125 OFFICE: NAVSEA IDENT#: 24986

SUBMITTED BY

PROCUREMENT REQUEST (PR) PREPARATION WITHIN NAVSEA IS A TIME-CONSUMING PROCESS INVOLVING MANY REVIEWS, DECISIONS, AND REFERENCES TO GOVERNMENT REGULATIONS AND DIRECTIVES. THIS PROPOSAL ADDRESSES THE PRACTICAL OBJECTIVE OF USING AUTOMATION TO EXPEDITE PR PREPARATION/CHANGES AND REDUCE THE NUMBER OF TIMES A PR IS RETURNED TO THE ORIGINATOR FOR CORRECTION. AUTOMATING THE PR PROCESS WILL (1) ASSIST PR ORIGINATORS THROUGH QUERY AND MENU FEATURES; (2) FACILITATE TAILORING TO SPECIFIC PROCUREMENT NEEDS; (3) ALLOW RAPID INCORPORATION OF CHANGES; (4) ENSURE CONSISTENCY OF THE PR PROCESS BY STORING RETRIEVABLE PREVIOUSLY APPROVED GENERIC PR WORK STATEMENTS, CDRLs SPECIFICATIONS, SPECIAL PROVISIONS AND OTHER REQUIRED TEXTUAL INFORMATION; (5) REDUCE THE REQUIRED PR PREPARATION TIME BY EXPLOITING MODERN WORD PROCESSING, DESKTOP PUBLISHING, AND PRINTING TECHNIQUES; AND (6) RESULT IN CONSISTENTLY HIGH-QUALITY PRODUCTS BY AUTOMATED FORMATTING AND PRINTING FEATURES. THE PROPOSED PHASE I EFFORT WILL EMPLOY RAPID PROTOTYPING TO DEMONSTRATE THE FEASIBILITY, ADVANTAGES, AND PRACTICALITY OF FULLY AUTOMATING THE PR PROCESS DURING PHASE II.

TECHNICAL RESEARCH ASSOCS
410 CHIPETA WY - STE 222
SALT LAKE CITY, UT 84108
CONTRACT NUMBER:
JOSEPH K WEEKS
TITLE:
MANUFACTURE OF HIGH T(c) SUPERCONDUCTING COMPOSITE WIRES
TOPIC# 165 OFFICE: NSWC IDENT#: 23815

IN ORDER TO USE THE NEW CERAMIC SUPERCONDUCTOR MATERIALS IN MANY APPLICATIONS, THE NORMALLY BRITTLE MATERIALS MUST BE FORMED INTO WIRES. THIS PROPOSAL SUGGESTS A WET CHEMISTRY TECHNIQUE FOR FORMING THE SUPERCONDUCTOR COMPOUND INTO A WIRE, WHICH WILL THEN BE COATED WITH A METAL JACKET TO PROTECT THE WIRE FORM PHYSICAL ABUSE AND ENVIRONMENTAL DEGRADATION. BECAUSE THE COATING PROCESS WILL BE ESSENTIALLY INDEPENDENT FROM THE SUPERCONDUCTOR FIBER FORMING PROCESS, EACH PROCESS MAY BE OPTIMIZED INDEPENDENTLY.

TECHNOLOGY INTEGRATION & DEV GP INC
ONE PROGRESS RD
BILLERICA, MA 01821
CONTRACT NUMBER:
NATHAN B HIGBIE
TITLE:
HIGH FREQUENCY HIGH TEMPERATURE LOW NOISE VIBRATION SENSOR AND CALIBRATORS
TOPIC# 87 OFFICE: NAVSEA IDENT#: 24563

SUBMITTED BY

AS SHIPS BECOME QUIETER, IMPROVED CAPABILITIES FOR MEASURING VIBRATION IN HIGH-FREQUENCY, HIGH-TEMPERATURE, LOW-NOISE ENVIRONMENTS ARE NEEDED. TIDG PROPOSES A UNIFIED APPROACH TO THE MEASUREMENT TECHNOLOGY THAT INCLUDES IMPROVEMENTS IN SENSORS, MOUNTING TECHNIQUES, AND CALIBRATION. HIGH-FREQUENCY ACCELEROMETERS USEFUL TO 50dHZ ALREADY EXIST, BUT THEIR MOSFET CIRCUITS SUFFER FROM HIGH NOISE AND A MAXIMUM TEMPERATURE OF 400 DEG F. TIDG PROPOSES TO EMPLOY AN INNOVATIVE PREAMPLIFIER DESIGN TO REDUCE NOISE BY 40 dB AND INCREASE THE TEMPERATURE RANGE TO 600 DEG F. THE ACCELEROMETER WILL HAVE DRAMATICALLY IMPROVED DYNAMIC RANGE, AND, AS AN ADDED BENEFIT, WILL ALSO HAVE IMPROVED LOW-FREQUENCY PERFORMANCE. SPECIAL MOUNTING TECHNIQUES FOR HIGH FREQUENCY MEASURMENTS ARE KNOWN BUT NEED TO BE VERIFIED IN PHASE I. FINALLY, WE PROPOSE TWO INNOVATIVE LOW-COST APPROACHES TO HIGH-FREQUENCY CALIBRATION THAT WILL USE OFF-THE-SHELF HARDWARE. PHASE I WILL INVESTIGATE THE FEASIBILITY OF CALIBRATING ACCELEROMETERS WITH THESE APPROACHES. PHASE I WILL DEMONSTRATE PERFORMANCE AND FEASIBILITY OF THE IMPROVED SENSOR AND THE CALIBRATION TECHNIQUES. PHASE II WILL PROVIDE HARDWARE FOR TEST, DEMONSTRATION AND FLEET USE.

TECHNOLOGY INTERNATIONAL INC
429 W AIRLINE HWY - STE S
LaPLACE, LA 70068
CONTRACT NUMBER:
DR ENJU LIANG
TITLE:
CONSTRUCTION OF A DETECTABLE DEFECT DRIFT DIFFUSION (D4) MODEL FO PREDICTION OF HELICOPTER GEARBOX LIFE EXPECTANCY
TOPIC# 250 OFFICE: NATC IDENT#: 24102

TECHNOLOGY INTERNATIONAL INCORPORATED (TII) IS PROPOSING THE CONSTRUCTION OF A DETECTABLE DEFECT DRIFT DIFFUSION (D4) MODEL FOR PREDICTION OF HELICOPTER GEARBOX LIFE EXPECTANCY. THE MODELING STRATEGY IS BASED ON PREDICTING FATIGUE OF TYPICAL MECHANICAL EQUIPMENT WITH ROLLING CONTACT, SUCH AS ROLLING ELEMENT BEARING AND GEAR OF THE HELICOPTER GEARBOX. THE RATE OF GROWTH OF SPECIFIC SIZES AND TYPES OF DEFECTS UNDER VARIOUS LOADING CONDITIONS WILL BE CONSIDERED BASED ON EXPERIMENTAL DETERMINATION OF STRESS/STRAIN TIME HISTORIES

SUBMITTED BY

FOR COMPONENT LIFE ESTIMATION. THUS, A REALISTIC MODEL FOR ANALYTICAL PREDICTION OF LIFE EXPECTANCY WILL BE DEVELOPED BY EMPLOYING STRUCTURAL FINITE ELEMENT ANALYSIS IN DYNAMIC SIMULATION AND STATISTICAL ESTIMATION OF FATIGUE PROPAGATION. FOR THIS PROPOSAL, THE EFFORT IS RESTRICTED TO THE MOST LIKELY DEFECTS ON A SINGLE REPRESENTATIVE ROLLING ELEMENT BEARING AND A SINGLE REPRESENTATIVE GEAR.

TEKNOWLEDGE FEDERAL SYSTEMS
501 MARIN ST - STE 214
THOUSAND OAKS, CA 91360
CONTRACT NUMBER:
RONALD K KANDT
TITLE:
EXPERT SYSTEMS FOR AIRBORNE COMPUTERS
TOPIC# 188 OFFICE: NSWC IDENT#: 23958

THE OBJECTIVE OF THIS PROJECT IS TO DEVELOP THE TECHNOLOGY TO PRODUCE COMPACT AND EFFICIENT EXPERT SYSTEMS. IN SUPPORT OF THIS OBJECTIVE EXISTING AI REPRESENTATION AND PROCESSING TECHNIQUES WILL BE CLASSIFIED AND OPTIMIZATION TECHNIQUES FOR EACH ONE ANALYZED. THE PROPOSED RESEARCH WILL INVOLVE A SURVEY OF THE LITERATURE, IN ADDITION TO ORIGINAL RESEARCH. A SOFTWARE PROTOTYPE WILL BE CONSTRUCTED TO DEMONSTRATE THE FEASIBILITY OF THE CONCEPT. THERE ARE THREE PRIMARY BENEFITS OF THIS WORK. FIRST, A COMPILER FOR AN ARTIFICIAL INTELLIGENCE (AI) LANGUAGE WILL BE DEVELOPED. SECOND, METHODS FOR GENERATING FINITE STATE MACHINES, WHICH CAN BE EFFICIENCLY IMPLEMENTED IN TERMS OF PROGRAMMABLE READ-ONLY MEMORIES AND MICROPROCESSORS, FOR APPROPRIATE CATEGORIES OF EXPERT SYSTEMS WILL BE DEVELOPED. THIRD, THE POTENTIAL USE OF ASSOCIATIVE MEMORIES IN CONVENTIONAL ARCHITECTURES WILL BE DETERMINED. THE COMMERCIAL APPLICATIONS OF THIS WORK ARE NUMEROUS. SUCH TECHNOLOGY WOULD ALLOW THE DELIVERY OF "REAL TIME" EXPERT SYSTEMS ON COST-EFFECTIVE, GENERAL-PURPOSE MACHINES, WITH OR WITHOUT ADDITIONAL HARDWARE DEVICES.

TERRA TEK INC
400 WAKARA WY
SALT LAKE CITY, UT 84108
CONTRACT NUMBER:
JIAN-JUEI WANG
TITLE:
FATIGUE LIFE PREDICTION BASED ON THREE-DIMENSIONAL STRESS ANALYSI
TOPIC# 250 OFFICE: NATC IDENT#: 24103

SUBMITTED BY

THE NAVY IS DEVELOPING METHODS TO DETERMINE THE SIZE AND TYPE OF DEFECTS IN HELICOPTER GEARBOXES. WITH THIS KNOWLEDGE A BETTER UNDERSTANDING OF THE FATIGUE-CRACK PROPAGATION CHARACTERISTICS OF THE GEARS AND BEARINGS WILL BE POSSIBLE AND ENHANCE THE ACCURACY IN PREDICTING THE FATIGUE LIFE. THE PURPOSE OF THIS PROPOSAL IS TO UNDERTAKE THIS STEP BY INVESTIGATING THE THREE-DIMENSIONAL STRESS DISTRIBUTION AND THE INFLUENCE OF THE THREE-DIMENSIONAL EFFECTS ON THE STRESS INTENSITY FACTORS ON THE FATIGUE LIFE OF GEARS AND BEARINGS. PROBABILISTIC FRACTURE MECHANICS IS TO BE APPLIED IN THE COUPLING OF THE STATISTIC DISTRIBUTION OF SIZE AND TYPE OF THE DEFECTS AND THE FATIGUE-CRACK PROPAGATION CHARACTERISTICS. EVENTUALLY, A COMPLETE COMPUTER MODEL FOR IMPROVED PREDICTION OF THE FATIGUE LIFE OF THE GEARBOXES WILL BE DEVELOPED IN PHASE II.

TESSERA RESEARCH CORP
445 UNION BLVD - STE 203
LAKEWOOD, CO 80228
CONTRACT NUMBER:
DR D O'BRIEN
TITLE:
UTILIZATION OF ON-BOARD DIGITAL GEOMAGNETIC FIELD DATA AND ANCILLARY SOFTWARE TO OPTIMIZE MAGNETIC ASW OPERATIONS
TOPIC# 214 OFFICE: NADC IDENT#: 24048

THIS PROPOSAL SEEKS TO INVESTIGATE THE FEASIBILITY OF IMPROVING MAGNETIC ASW BY UTILIZING AN ON BOARD DIGITAL RECORD OF THE EARTH'S GEOMAGNETIC FIELD. MAGNETIC DETECTION TECHNIQUES FOR SUBMARINES REQUIRE SEPARATION OF THE SIGNATURE OF THE SUBMARINE FROM THE BACK-GROUND FIELD. TESSERA PROPOSES TO DEVELOP A SYSTEM TO IMPROVE ANOMALY SEPARATION BY EMPLOYING EXISTING DIGITIZED GEOMAGNETIC FIELD DATA TO ACCOUNT FOR, AND SEPARATE FROM THE SIGNAL OF INTEREST, THE EFFECTS OF THE EARTH'S FIELD. AN ALGORITHM IS PROPOSED WHICH UTILIZES EXISTING MAGNETIC DATA TO LOCATE ANOMALOUS TARGETS BY DIGITAL FILTERING OF OBSERVED ASW DATA TOGETHER WITH PROPERLY COR-RECTED GEOMAGNETIC FIELD DATA. THE COMBINATION OF THESE DATA ALLOW DESIGN OF AN OPTICAL SIGNAL EXTRACTION FILTER WHOSE WEIGHTS VARY FROM POSITION TO POSITION DEPENDING UPON THE NATURE OF THE GEOMAGNETIC FIELD. TARGET DETECTION IS ENHANCED BY MEANS OF AN OPTIMIZED DIGITAL

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ALGORITHM EMPLYING BOTH THE EXISTING DATA BASE AND THE UPDATED MAGNETIC DATA OBSERVED BY THE ASW AIRCRAFT.

TEXAS RESEARCH INSTITUTE INC
9063 BEE CAVES RD
AUSTIN, TX 78733
CONTRACT NUMBER:
PATRICK E CASSIDY
TITLE:
DEVELOPMENT OF MATERIALS SUITABLE FOR TORPEDO NOSE WINDOWS
TOPIC# 112 OFFICE: NAVSEA IDENT#: 24900

THE TORPEDO NOSE WINDOW APPLICATION REQUIRES MATERIALS WITH A UNIQUE COMBINATION OF PROPERTIES. THESE MATERIALS SHOULD BE STRONG, NOT VERY LOSSY, RELATIVELY INERT, ACOUSTICALLY WELL MATCHED TO SEAWATER, INEXPENSIVE, AND EASY TO FABRICATE. SOFT, RELATIVELY LOSSY RUBBERS HAVE BEEN USED SO FAR. TWO TECHNOLOGICAL DEVELOPMENTS OF RECENT YEARS FORESHADOW THE DEVELOPMENT OF IMPROVED MATERIALS WITH VERY LOW RISK. CASTABLE SYNTACTIC FOAMS HAVE BEEN PRODUCED WHICH COME CLOSE TO MATCHING BOTH THE DENSITY AND SOUND SPEED OF WATER. THE BEST CANDIDATES ARE BASED ON FLUORINATED PRECURSER MATERIALS. CERAMIC AND CARBON MICROSPHERES HAVE RECENTLY BECOME AVAILABLE THAT ARE MORE RUGGED THAN THEIR GLASS COUNTERPARTS. THIS PROJECT WILL EVALUATE THESE TWO TECHNOLOGIES. SYNTACTIC FOAMS MADE FROM BOTH ENGINEERING PLASTICS SUITABLE FOR EXTRUSION AND MOLDING, AND CASTABLE POLYMERS WILL BE PRODUCED WITH SPECIFIED ACOUSTIC PROPERTIES AND EVALUATED. THE MILLING/MIXING REQUIRED TO PROCESS THE FORMER MATERIALS DICTATES USE OF THE LESS FRAGILE FILLERS NOW AVAILABLE.

TEXAS RESEARCH INSTITUTE INC
9063 BEE CAVES RD
AUSTIN, TX 78733
CONTRACT NUMBER:
D E GLOWE
TITLE:
TECHNOLOGY FOR MAKING UNDERWATER CONNECTORS RESISTANT TO CATHODIC DELAMINATION
TOPIC# 120 OFFICE: NAVSEA IDENT#: 24937

SUBMITTED BY

THIS PROJECT WILL IDENTIFY AND SPECIFY ENGINEERING PARAMETERS NECESSARY TO MANUFACTURE NON-METALLIC ELECTRICAL CONNECTORS FOR UNDERWATER SUBMARINE AND SURFACE SHIP SONAR USE. MORE SPECIFICALLY, THIS PROJECT WILL IDENTIFY EQUIPMENT, MATERIALS AND PROCESSES NECESSARY TO ENABLE NAVAL SUPPORT FACILITIES TO MAKE NON-METALLIC UNDERWATER ELECTRICAL CONNECTORS RESISTANT TO CATHODIC DELAMINATION.

TEXTILE TECHNOLOGIES INC
2800 TURNPIKE DR
HATBORO, PA 19040
CONTRACT NUMBER:
T D LYNCH
TITLE:
PASSIVE THERMAL MANAGEMENT THROUGH THE USE OF ULTRA-HIGH THERMAL CONDUCTIVITY FIBERS
TOPIC# 96 OFFICE: NAVSEA IDENT#: 24768

THERE IS A GREAT NEED FOR ADVANCED MATERIALS DEVELOPMENT IN THE AREA OF ADVANCED ELECTRONICS. THE SPECIFIC AREA OF INTEREST IN THIS PROJECT IS THE USE OF NEW MATERIALS TO HELP DISSIPATE HEAT FROM ELECTRONICS. WITH THE ADVENT OF VHSIC AND EVEN MORE ADVANCED ELECTRONIC SYSTEMS AND WITH THE DEVELOPMENT OF ADVANCED SUPER-CONDUCTORS, IT IS CRUCIAL TO GIVE THE DESIGNER THE ABILITY TO MANAGE EXTREMELY HIGH AND RAPIDLY GENERATED HEAT LOADS. THIS EFFORT WILL FOCUS ON THE DEVELOPMENT OF TEXTILES WOVEN FROM ULTRA-HIGH THERMAL CONDUCTIVITY REINFORCING FIBERS. THESE TEXTILES AND THE RESULTING COMPOSITES WILL GIVE THE DESIGNER A PASSIVE THERMAL MANAGEMENT SYSTEM WHICH CAN BE USED TO CHANNEL THERMAL LOADS WHILE PROVIDING REINFORCEMENT TO THE CIRCUIT BOARD. UNDER THIS EFFORT, THE TECHNOLOGY TO WEAVE FABRICS AND PREFORMS WILL DEVELOPED INCREASING THE EFFICIENCY OF PRODUCING CIRCUIT BOARDS FROM THESE MATERIALS, REDUCING THE COST OF THE BOARDS, AND INCREASING THE THERMAL EFFICIENCY OF THE BOARDS.

TEXTILE TECHNOLOGIES INC
2800 TURNPIKE DR
HATBORO, PA 19040
CONTRACT NUMBER:
STEPHEN P ZAWISLAK
TITLE:
PASSIVE THERMAL SIGNATURE SUPPRESSION THROUGH HEAT DISPERSION
TOPIC# 32 OFFICE: MARINE CORPS IDENT#: 29896

SUBMITTED BY

THERE IS A GREAT NEED FOR ADVANCED INFRARED SIGNATURE SUPPRESSION SYSTEMS IN THE U.S. MARINE CORPS. THE EXISTANCE OF THESE SIGNATURES MAKE THE ASSOCIATED WEAPON SYSTEM VULNERABLE TO ENEMY ATTACK. MOST IR SUPPRESSION SYSTEMS AVAILABLE TODAY ARE BULKY, HEAVY AND UNACCEPTABLE FOR MOST APPLICATIONS ESPECIALLY AIRCRAFT. THIS EFFORT WILL FOCUS ON BUILDING THERMAL SIGNATURE SUPPRESSION SYSTEMS INTO HIGH PERFORMANCE MATERIALS SUCH AS ADVANCED COMPOSITE STRUCTURES. THE METHOD OF SUPPRESSION WILL BE PASSIVE IN NATURE AND INVOLVE THE RAPID DISPERSION OF HEAT SO AS TO LOWER OVERALL TEMPERATURES AND TO ELIMINATE THE APPEARANCE OF HOT SPOTS. AIRCRAFT STRUCTURES FABRICATED FROM COMPOSITE MATERIALS WHERE THE REINFORCEMENT FOR THE COMPOSITE WILL HAVE EXTREMELY HIGH THERMAL CONDUCTIVITY WILL BE DEVELOPED. THE COMPOSITES WILL NOT ONLY HAVE EXCELLENT MECHANICAL PROPERTIES BUT WILL ALSO BE ABLE TO DISPERSE LARGE AMOUNTS OF HEAT, RAPIDLY.

TROUND INTERNATIONAL INC
RD#1 - BOX 13-T / ALPHA INDUSTRIAL PK
PHILLIPSBURG, NJ 08865
CONTRACT NUMBER:
DUANE E ISING
TITLE:
ADVANCED GUN AND AMMUNITION CONCEPT
TOPIC# 211 OFFICE: NWC IDENT#: 23184

RAPID FIRE HIGH VELOCITY AIRCRAFT GUN SYSTEMS HAVE MATURED TO THE POINT WHERE ONLY MARGINAL IMPROVEMENTS IN SYSTEM EFFECTIVENESS, WEIGHT REDUCTION, VOLUME REDUCTION, AND COST EFFECTIVENESS APPEAR ATTAINABLE. MOST OF THESE SYSTEMS ARE EXTERNALLY POWERED GATLING GUNS FIRING METALLIC CASED AMMUNITION, AND THESE COMPONENTS HAVE BENEFITED FROM OVER TWENTY-FIVE YEARS OF DESIGN REFINEMENTS AND MATERIAL IMPROVEMENTS. MOST RECENT EFFORTS HAVE CENTERED ON AMMUNITION PERFORMANCE. THESE HAVE YIELDED IMPROVED PROJECTILE DESIGNS SUCH AS HARD CORE PENETRATORS, MULTI-PURPOSE EXPLOSIVE WARHEADS, AND DEVELOPMENT OF FULLY TELESCOPED COMPACTED CHARGE HIGH VELOCITY AMMUNITION. GUN SYSTEMS SHOULD STILL PLAY A MAJOR ROLL IN FUTURE AIRCRAFT BECAUSE OF THEIR RELIABILITY AND COST EFFECTIVENESS, AND THEREFORE THERE WILL BE A NEED NOT ONLY FOR IMPROVED AMMUNITION, BUT

SUBMITTED BY

SIMPLER AND LIGHTER HIGH PERFORMANCE GUN MECHANISMS AS WELL. TROUND INTERNATIONAL PROPOSES TO DEVELOP A 20MM GUN SYSTEM BASED UPON ITS UNIQUE OPEN-CHAMBER TM DESIGN WHEREIN A SIMPLE ROTARY MECHANISM WITH A RELATIVELY SMALL NUMBER OF MOVING PARTS REPLACES THE COMPLEX RECIPROCATING ONE USED IN ALL CONVENTIONAL GUNS. TROUND WILL DEMONSTRATE IN PHASE I THE ABILITY TO MEET ALL THE STATED REQUIREMENTS FOR THIS WEAPON SYSTEM INCLUDING THE USE OF AN ALL PLASTIC CARTRIDGE CASE WITH INSENSITVE MUNITIONS CHARACTERISTICS.

TXS INC
8961 TESORO DR - STE 544
SAN ANTONIO, TX 78217
CONTRACT NUMBER:
DR MICHAEL R THOMAS
TITLE:
THE RAPID SEARCH OF COMPLEX DATA BASES WITH TRANSFORM IMAGING
TOPIC# 216 OFFICE: NUSC IDENT#: 23052

THE VOLUME OF INFORMATION AVAILABLE TO DECISION MAKERS IN THE GOVERNMENT AND PRIVATE SECTORS IS OVERWHELMING, AND IS GROWING DAILY. EXISTING DATA BASE MANAGEMENT SYSTEMS (DBMS) HAVE SEVERAL SHORTCOMINGS IN DEALING WITH THIS INFORMATION RELATE TO 1) THE REQUIREMENT TO DEFINE A PRIORI, RIGID STRUCTURES FOR THE DATA AND 2) THEIR INEFFICIENCY AT ADDING NEW RELATIONSHIPS BETWEEN DATA ITEMS ON THE FLY. THIS PROJECT WILL PRODUCE DESIGN DOCUMENTATION FOR, AND A WORKING PROOF-OF-CONCEPT PERSONAL COMPUTER BASED DBMS, USING EXISTING COMMERCIALLY AVAILABLE PRODUCTS, FOR THE RAPID STORAGE AND RETRIEVAL OF STRUCTURED AND UNSTRUCTURED ACOUSTIC INTELLIGENCE (ACINT) DATA. A NEW SOFTWARE TECHNIQUE KNOWN AS "TRANSFORM IMAGING" CAN OVERCOME THE ANALYTICAL AND DATA MANAGEMENT PROBLEMS OF CURRENT DBMSs BY CAPTURING THE ACTUAL CONTENT OF DOCUMENTS IN A MULTI-DIMENSIONAL, PHASE-SPACE, IMAGE. THIS DBMS ALLOWS EXTREMELY RAPID AND EFFICIENT CATEGORIZATION OF DATA AND PERMITS RETRIEVAL OF THAT DATA WITH A FRACTION OF THE COMPUTATIONAL COMPLEXITY THAT IS NORMALLY ASSOCIATED WITH THIS TASK.

UFA INC
335 BOYLSTON ST
NEWTON, MA 02159
CONTRACT NUMBER:
DR ARTHUR GERSTENFELD
TITLE:
NAVAL SUPPLY CENTER ADVISORY SYSTEM (NSCAS)
TOPIC# 53 OFFICE: NAVSUP IDENT#: 22277

SUBMITTED BY

THE OBJECTIVE OF THIS PROJECT IS TO SHOW THE FEASIBILITY OF AN NSC ADVISORY SYSTEM. THIS SYSTEM WILL USE A SET OF COOPERATING EXPERT SYSTEMS. IT WILL EMBED THE KNOWLEDGE OF THE BEST NSC TECHNICIANS WHICH WILL THAN BECOME THE STANDARD FOR OTHERS. AN INCREMENTAL APPROACH WILL BE USED SO THAT THE SYSTEM WILL BE ABLE TO GROW OVER TIME (I.E. CAN START SMALL AND KEEP ADDING). AN IMPORTANT FEATURE OF THE SYSTEM WILL BE ITS TEACHING CAPABILITY. A SAMPLE TUTORING PROGRAM WILL BE INCLUDED AS WELL AS ACTUAL CASES IN ORDER TO HELP TRAIN NEW PERSONS. DURING THIS PHASE I WE WILL WORK CLOSELY WITH WASHINGTON, D.C. AND NSC ON THE EAST COAST.

UFA INC
335 BOYLSTON ST
NEWTON, MA 02159
CONTRACT NUMBER:
DR ARTHUR GERSTENFELD
TITLE:
A HIERARCHICAL APPROACH TO DATA FUSION
TOPIC# 219 OFFICE: NUSC IDENT#: 23092

THE GOAL OF THIS RESEARCH PROJECT IS TO DEVELOP A PRELIMINARY PROTOTYPE OF A HIERARCHICAL SYSTEM FOR DATA FUSION. THE SYSTEM WILL UTILIZE BOTH THE QUALITATIVE AND JUDGEMENTAL REASONING PROCESS OF A HUMAN EXPERT, AS WELL AS THE QUANTITATIVE CAPABILITIES OF MOST STATISTICAL AND PROBABILISTIC TECHNIQUES. ONE OF THE IMPORTANT AND DIFFICULT TASKS IS TO INTEGRATE CONFLICTING INFORMATION FROM VARIOUS SENSORS FOR SITUATION ASSESSMENT. OUR SYSTEM CONSISTS OF FIVE DISTINCT LAYERS. THE LOWEST LAYER, LEVEL 0, CONSISTS OF RAW DATA. LEVEL 1 IS FOR DATA ALIGNMENT AND DATA ASSOCIATION. LEVEL 2 IS FOR DATA CORRELATION AND FUSION. THE RESULTS FROM LEVEL 2 WILL BE USED BY LEVEL 3 FOR DATA ANALYSIS AND INTERPRETATION. IT IS COMMONLY CALLED SITUATION ASSESSMENT. THE RECOMMENDATIONS OF THE SYSTEM WILL BE PRESENTED TO THE USERS, WHICH IS THE HIGHEST LAYER - LEVEL 4.

VERITAY TECHNOLOGY INC
PO BOX 305 - 4845 MILLERSPORT HWY
EAST AMHERST, NY 14051
CONTRACT NUMBER:
EDWARD B FISHER
TITLE:
ADVANCED 20MM AMMUNITION CONCEPT
TOPIC# 211 OFFICE: NWC IDENT#: 23183

SUBMITTED BY

NO ABSTRACT FOR VERITAY TECHNOLOGY INC

VERITAY TECHNOLOGY INC
PO BOX 305
EAST AMHERST, NY 14051
CONTRACT NUMBER:
GERLAD STERBUTZEL
TITLE:
CASELESS AMMUNITION GUN SYSTEM
TOPIC# 68 OFFICE: NAVAIR IDENT#: 24480

THE CONVERSION OF A CONVENTIONAL CANON-CALIBER GUN SYSTEM TO A CASELESS AMMUNITION SYSTEM WILL CUT THE WEIGHT OF AMMUNITION IN HALF, REDUCE THE SPACE REQUIRED FOR IMPLEMENTATION OF THIS SYSTEM BY ONE-THIRD, LOWER OVERALL COSTS SIGNIFICANTLY, ELIMINATE THE NEED FOR SPECIAL STRATEGIC MATERIALS, AND RESULT IN IMPORTANT SAFETY ADVANTAGES. TO BE SUCCESSFUL, HOWEVER, A CASELESS SYSTEM MUST REPLACE ALL FUNCTIONS CURRENTLY PERFORMED BY THE CASE: OBTURATION, STRUCTURAL STRENGTH, HEAT TRANSFER AND HANDLEABILITY. THE SOLUTION TO THESE PROBLEMS REQUIRES SPECIAL APPLICATIONS OF THERMAL AND HIGH-PRESSURE-GAS TECHNOLOGY. OUR MORE THAN 20 YEARS EXPERIENCE IN STUDYING CASELESS AMMUNITION SYSTEMS AND OUR RECENT SUCCESSFUL DEVELOPMENT OF A 7.62 CASELESS GUN SYSTEM HAS LED TO TECHNICAL ADVANCES THAT INDICATE A CANON-CALIBER, CASELESS SYSTEM IS NOW WITHIN OUR GRASP. THE PURPOSE OF THIS PHASE I EFFORT IS TO DEMONSTRATE THE FEASIBILITY OF APPLYING SPECIAL SEALING, ABLATOR, CONSOLIDATION, AND ENCAPSULATION TECHNIQUES--WHICH HAVE ALREADY BEEN SHOWN TO BE PROMISING AT SMALLER CALIBERS--TO A SYSTEM IN THE CANON-CALIBER RANGE. RISK WILL BE CONSIDERABLY REDUCED BY LIMITING THIS FEASIBILITY STUDY TO THE CONVERSION OF AN EXISTING CONVENTIONAL SYSTEM TO A CARELESS SYSTEM, RATHER THAN ATTEMPTING TO DEVELOP A CANNON-CALIBER CASELESS SYSTEM FROM SCRATCH.

VISIDYNE INC
299 CHERRY HILL RD - STE 306
PARSIPPANY, NJ 07054
CONTRACT NUMBER:
PETER HIRSCH
TITLE:
ANTI-SUBMARINE WARFARE DISPLAY
TOPIC# 243 OFFICE: NOSC IDENT#: 24165

SUBMITTED BY

DETECTION OF BROAD-BAND TARGETS ON SONAR TIME-BEARING DISPLAYS REQUIRES THAT A THRESHOLD BE ESTIMATED. THE ESTIMATE IS DEGRADED BY LEAKAGE THROUGH THE BEAM-FORMER SIDELOBES. TIME-BEARING COMPENSATION (TBC) DECREASES THE EFFECT OF SIDELOBE LEAKAGE, AND THEREBY IMPROVES THE THRESHOLD ESTIMATE AND DETECTION PERFORMANCE. THE THEORETICAL BASIS FOR TBC IS AN OPTIMALITY CRITERION WHICH LEADS TO A FORMULA FOR IMPROVING THE BEAMFORMER OUTPUTS. THE GREAT ADVANTAGE OF TBC IS THAT IT DOES NOT REQUIRE ACCESS TO THE BEAMFORMER INPUTS. A DEMONSTRATION AND EVALUATION OF THE TBC CONCEPT IS PROPOSED.

VREULS RESEARCH CORP
68 LONG CT - STE E
THOUSAND OAKS, CA 91360
CONTRACT NUMBER:
RICHARD W OBERMAYER
TITLE:
BATTLE FORCE RESEARCH SIMULATOR SCENARIO MODULARIZATION
TOPIC# 228 OFFICE: NTSC IDENT#: 23510

THIS PROPOSAL PRESENTS A SIX-MONTH PROGRAM FOR DEVELOPMENT AND TESTING OF A TESTBED SYSTEM, CALLED INTELLIGENT SCENARIO ASSISTANCE AND ANALYSIS CONSOLE (ISAAC). ISAAC WILL ALLOW NON-SUBJECT MATTER EXPERTS TO USE AN INTELLIGENT USER INTERFACE TO BUILD AND VERIFY A BATTLE FORCE TACTICAL TRAINING SCENARIO. THE USER WILL HAVE THE ABILITY TO SELECT AND VERIFY VARIOUS DOCTRINAL AND TACTICAL SETUPS, THE PLATFORMS AND FORMATIONS, THE FORCE POSTURE, AND THE WEAPONS SYSTEMS USED BY THE FORCES PORTRAYED. AMPHIBIOUS WARFARE HAS BEEN SELECTED AS A DEMONSTRATION VEHICLE FOR THIS PROPOSAL; HOWEVER, THE INTENT WILL BE TO DEVELOP A GENERAL CAPABILITY TO DEVELOP SCENARIOS. THE DEVELOPMENT OF ISAAC WILL BE DIRECTED TOWARD THE ACHIEVEMENT OF THREE GENERAL OBJECTIVES: (1) TO DEVELOP SCENARIOS QUICKLY AND ACCURATELY WITH REDUCED LABOR AND WORKLOAD REQUIREMENTS, (2) MAXIMIZE ACHIEVEMENT OF TRAINING OBJECTIVES THROUGH SCENARIO CONTROL, AND (3) MINIMIZE MILITARY SUBJECT-MATTER EXPERT (SME) INVOLVEMENT AND ENHANCE USE OF CIVILIAN SCIENTISTS AND ENGINEERS. SIX TASKS ARE PROPOSED: (1) PERFORM FRONT-END ANALYSES, (2) DEVELOP SYSTEM SPECIFICATIONS, (3) DEVELOP A TESTBED SYSTEM, (4) CONDUCT SYSTEM WALK-THROUGHS WITH

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SMES, (5) DEVELOP A PHASE II PLAN, AND (6) PREPARE A FINAL REPORT.

WAGNER D H ASSOCS INC
27 W QUEEN WY - STE 301
HAMPTON, VA 23669
CONTRACT NUMBER:
DR W REYNOLDS MONACH
TITLE:
ANTI-SHIP TARGETING USING PREDICTION OF ENEMY TACTICS
TOPIC# 195 OFFICE: NSWC/JCMPO IDENT#: 22215

THE PROPOSED PROJECT IS TO DEVELOP A TECHNIQUE WHICH WILL PREDICT THE LOCATION OF ENEMY SURFACE UNITS BASED ON CURRENT TACTICAL DATA, ESTIMATES OF PROBABLE ENEMY TACTICS, AND THE "NEGATIVE INFORMATION" GAINED FROM UNSUCCESSFUL SEARCH FOR THE UNIT. IN ADDITION, WE WILL IMPLEMENT THE TECHNIQUE IN A PROGRAM FOR TEST AND EVALUATION PURPOSES. THE FOUNDATION FOR THIS TECHNIQUE WILL BE THE ALGORITHMS USED IN THE PROGRAM PACSEARCH, WHICH HAVE BEEN USED SUCCESSFULLY FOR PRODUCING ESTIMATES OF THE LOCATION OF TARGETS BASED ON CONTACT DATA, ESTIMATED MOTION, AND UNSUCCESSFUL SEARCH AGAINST THE UNIT. IN THE PAST, THESE TECHNIQUES HAVE BEEN APPLIED PRIMARILY IN ANTI-SUBMARINE WARFARE (ASW). THIS PROJECT WILL BE AN ESSENTIAL FIRST STEP TOWARD APPLYING THEM SPECIFICALLY TO ANTI-SURFACE WARFARE (ASUW). IN PHASE I, WE WILL ADD FURTHER ENEMY SURFACE TARGET TACTICS AND IMPROVE AND EXTENSIVELY TEST THE ALGORITHMS USED TO UPDATE THE SYSTEM FOR ADDITIONAL CONTACTS. THESE DEVELOPMENTS WILL PREPARE FOR A PHASE II PROJECT IN WHICH THE TRACKING TECHNIQUE WILL BE FURTHER IMPROVED AND DEVELOPED INTO A PROTOTYPE FULL SCALE ASUW TRACKING SYSTEM. IN PHASE III, IT IS INTENDED THAT THE TRACKING TECHNIQUE BE INTEGRATED INTO AN OPERATIONAL NAVY ASUW SYSTEM.

WAGNER D H ASSOCS INC
27 W QUEENS WY - STE 301
HAMPTON, VA 23669
CONTRACT NUMBER:
DR JOSEPH H DISCENZA
TITLE:
THE USE OF TRACK-TO-TRACK CORRELATION AND NEGATIVE INFORMATION IN MULTI-SENSOR DATA FUSION
TOPIC# 215 OFFICE: NUSC IDENT#: 23014

SUBMITTED BY

THE PROPOSED RESEARCH CONSISTS OF A FEASIBILITY STUDY AND PROTOTYPE ALGORITHM DEVELOPMENT FOR USE OF TWO PREVIOUSLY UNTESTED CONCEPTS IN NAVY SURFACE CONTACT DATA FUSION PROBLEMS. THE FIRST CONCEPT IS NEGATIVE INFORMATION, WHICH MEANS ACCOUNTING FOR ALL SENSOR'S DETECTION CAPABILITIES AND TRAJECTORIES IN ADDITION TO THE CONTACTS WHICH THEY GENERATE. THE SECOND CONCEPT IS TRACK-TO-TRACK CORRELATION, WHICH MEANS THAT A NEW CONTACT IS ASSUMED TO CORRELATE WITH A STREAM OF PAST CONTACTS CALLED A TRACK WITH PROBABILITY 1, AND THIS TRACK MAY CORRELATE WITH ONE OR MORE OTHER TRACKS WITH PROBABILITY <1. IN TYPICAL AFLOAT CORRELATION STRATEGIES, EACH CONTACT IS TREATED AS AN INDEPENDENT EVENT AND IS COMPARED TO ALL EXISTING HYPOTHETICAL TRACKS WITHOUT REGARD TO PREVIOUS CONTACTS. OUR APPROACH IS FIRST TO DEVELOP PRELIMINARY MATHEMATICAL MODELS OF THE SURFACE PICTURE FUSION PROBLEM INCLUDING OPINTEL, ELINT, ESM, RADAR, AND SONAR SOURCES. NEXT, WE WILL DEVELOP A SET OF SCENARIOS REPRESENTING VARIOUS COMBINATIONS OF SURFACE TARGETS, DATA SOURCES, AND MOTION. FINALLY, WE WILL IMPLEMENT PROTOTYPE ALGORITHMS FOR TESTING THEM AGAINST THE BENCHMARK SCENARIOS.

WAGNER D H ASSOCS INC
STATION SQUARE ONE
PAOLI, PA 19301
CONTRACT NUMBER:
DR ROBERT P BUEMI
TITLE:
CONTACT MANAGEMENT OPERATOR INTERFACE IN THE CONTEXT OF MULTIPLE HYPOTHESIS DATA FUSION
TOPIC# 223 OFFICE: NUSC IDENT#: 23127

DATA FUSTION IN THE CONTEXT OF MULTI-TARGET, MULTI-SENSOR OCEAN SURVEILLANCE IS A PROBLEM OF CONSIDERABLE CURRENT INTEREST. THE CURRENT GENERATION OF CORRELATION AND TRACKING ALGORITHMS (CTAs) GENERATE AND PROCESS MULTIPLE REPORT-TO-TRACK CORRELATION HYPOTHESES. THE LARGE VOLUME OF INFORMATION POTENTIALLY AVAILABLE FROM SUCH MULTIPLE HYPOTHESIS CONTACT MANAGEMENT ALGORITHMS (MHCMA) HAS THE POTENTIAL TO OVERWHELM THE USER AND CREATES NEW REQUIREMENTS FOR THE DESIGN OF OPERATOR INTERFACES. WE PROPOSE TO DEVELOP AS PART OF OUR PHASE I EFFORT A PROTOTYPE MHCMA WHICH INCORPORATES OPERATOR INTER-

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ACTION AT A LEVEL WHICH BOTH EXPLOITS THE INTERPRETIVE SKILLS OF THE OPERATOR AND AVOIDS OVERBURDENING HIM WITH LOW-INTEREST INFORMATION. THE PARTICULAR MHCMA WE PROPOSE TO IMPLEMENT WILL BUILD ON AN EXISTING CORRELATION AND TRACKING ALGORITHM CALLED MATCH, PREVIOUSLY DEVELOPED BY THIS FIRM FOR THE MULTI-TARGET OCEAN SURVEILLANCE APPLICATION AND WILL INCORPORATE NEW DATA STRUCTURES DESIGNED TO AGGREGATE MULTI-HYPOTHESIS OUTPUT INTO WELL-DEFINED AND REASONABLY STABLE (OVER TIME) TARGET TRACK-LIKE CONSTRUCTS REFERRED TO AS CONSTRUCTED TRACK COMPLEXES (CTCs). THE ALGORITHM WILL SUPPORT GRAPHICAL DISPLAYS TO ALLOW OPERATOR INTERFACE IN THE FORM OF HYPOTHESIS MODIFICATION AT BOTH THE SCENE AND CTC LEVELS. WE WILL TEST THE MODEL FIRST ON A HOST SUN 3/60 COMPUTER AND THEN IN A NAVY SUPPLIED TESTBED ENVIRONMENT.

WAGNER D H ASSOCS INC
27 W QUEENS WY - STE 301
HAMPTON, VA 23669
CONTRACT NUMBER:
DR W REYNOLDS MONACH
TITLE:
SURFACE SURVEILLANCE AND SEARCH ENHANCEMENTS USING PREDICTION OF ENEMY TACTICS
TOPIC# 187 OFFICE: NSWC IDENT#: 23941

THE PROPOSED PROJECT IS TO DEVELOP A SYSTEM WHICH WILL (1) PREDICT THE LOCATION OF ENEMY SURFACE UNITS BASED ON CURRENT TACTICAL DATA, ESTIMATES OF PROBABLE ENEMY TACTICS, AND PREVIOUS UNSUCCESSFUL SEARCH FOR THE UNIT, AND (2) PRODUCE RECOMMENDED SEARCH AND SURVEILLANCE PLANS BASED ON AVAILABLE RESOURCES, THEIR EFFECTIVENESS, AND THE EFFECT OF SEARCH RESULTS AND TARGET TACTICS ON OWN FORCE ACTIONS. THE FOUNDATION FOR THIS SYSTEM WILL BE THE TECHNIQUES IN THE PROGRAM PACSEARCH, WHICH HAVE BEEN USED SUCCESSFULLY (PRIMARILY IN ANTI-SUBMARINE WARFARE) FOR PRODUCING TARGET LOCATION ESTIMATES BASED ON CONTACT DATA, ESTIMATED MOTION OF THE UNIT, AND UNSUCCESSFUL SEARCH AGAINST THE UNIT, AS WELL AS FOR EVALUATING AND PRODUCING SEARCH PLANS. THIS PROJECT WILL BE AN ESSENTIAL FIRST STEP TOWARD APPLYING THESE TECHNIQUES SPECIFICALLY TO ANTI-SURFACE WARFARE (ASUW). IN PHASE I, WE WILL IMPROVE THE ALGORITHMS USED IN CONTACT UPDATING, AND ADD ADDITIONAL ENEMY SURFACE TARGET TACTICS

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AND NEW APPROACHES AND DATA FOR PRODUCING RECOMMENDED SEARCH AND SURVEILLANCE PLANS. THIS WILL PREPARE FOR A PHASE II PROJECT IN WHICH THE SYSTEM WILL BE IMPROVED AND DEVELOPED INTO A PROTOTYPE FULL SCALE ASUW SEARCH AND SURVEILLANCE PLANNING SYSTEM. IN PHASE III, WE INTEND TO INTEGRATE IT INTO AN OPERATIONAL NAVY ASUW SYSTEM.

WORKSCIENCE CORP
18 - S 22ND ST
RICHMOND, VA 23223
CONTRACT NUMBER:
JOSEPH B WINTER JR
TITLE:
APPLICATION-BY-APPLICATION ANALYSIS OF IMPACT OF ROBOTICS ON THE STRUCTURE AND FUNCTION OF BILLETS AND MANNING ON TOTAL SHIP BASIS
TOPIC# 128 OFFICE: NAVSEA IDENT#: 25009

A MULTIPURPOSE TASK ANALYSIS METHODOLOGY IS PROPOSED WHICH WOULD FACILITATE THE UNDERSTANDING OF THE IMPACT OF ALLOCATING WORK PREVIOUSLY PERFORMED BY MEN TO ROBOTIC DEVICES. A DESIGN DATABASE LIBRARY OF ROBOTIC COMPONENTS, SORTABLE AS AN EQUIPMENT LIST IS PROPOSED WHICH IS BASED ON TASK FULLFILLMENT OF FUNCTIONS. ITEMS WHICH ARE ASSESSED INCLUDE THE WORK PRESENTLY PERFORMED BY MEN, THE WORK TO BE PERFORMED BY THE ROBOTIC DEVICE, AND ANY NEW TASKS GENERATED BY THE CREATION OF THE ROBOT. A COST/BENEFIT WEIGHTING SCHEME IS PROPOSED FOR EVALUATION OF ROBOTIC APPLICATIONS. ROBOTIC FUNCTIONAL COMPONENTS ARE MATCHED WITH TASKS, ELEMENTS OR SUB-ELEMENTS NOT ONLY IN ORDER TO DETERMINE THE FEASIBILITY OF THE APPROACH, BUT ALSO TO DRIVE THE DESIGN OF THE PROPOSED ROBOT. INNOVATIVE CONCEPTS INCLUDE A MULTIPURPOSE COMPUTERIZED TASK ANALYSIS SYSTEM THAT COMPARES DETAILS OF HUMAN TASK PERFORMANCE TO PROPOSED REPLACEMENT ROBOTIC FUNCTIONAL COMPONENTS. ROBOTIC DEVICE AND WORKSPACE MODELING UTILIZING DIGITZED IMAGING IS ALSO PROPOSED IN ORDER TO PROVIDE HUMAN FACTORS INPUT AT THE FRONT END OF THE DESIGN.

XI MAGNETIC
BOX 457A - RD 4
COATESVILLE, PA 19320
CONTRACT NUMBER:
DR JOHN L WALLACE
TITLE:
SPUTTERED METALLIC GLASS FOR ACCELEROMETERS
TOPIC# 164 OFFICE: NSWC IDENT#: 23783

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THE IMMEDIATE GOAL OF THIS PROPOSED WORK IN PHASE I IS TO SPUTTER DEPOSIT AND TEST SAMPLES OF METALLIC GLASS ON SILICON WAFERS. THE LONG TERM GOAL IS TO FABRICATE LOW COST, MONOLITHIC ACCELEROMETERS WHERE ALL OF THE COMPONENTS ARE INTEGRATED ONTO A SINGLE SILICON WAFER. THE MOST IMPORTANT PHASE I TASK WILL BE TO DEVELOP TECHNIQUES FOR DEPOSITING FILMS WITH BUILT-IN UNIAXIAL ANISOTROPY AND VERY LOW LEVELS OF INTRINSIC STRESS. THEN THE SENSITIVITY OF THESE FILMS (I.E. THE CHANGES IN PERMEABILITY AS A FUNCTION OF APPLIED STRESS) WILL BE MEASURED. A SECOND, LOWER PRIORITY PHASE I TASK WILL BE TO STUDY WAYS OF ELIMINATING THE USE OF DISCRETE SENSING COILS IN FAVOR OF A TRULY MONOLITHIC CONSTRUCTION.

XSIRIUS SCIENTIFIC INC
4676 ADMIRALTY WY - STE 530
MARINA DEL RAY, CA 90292
CONTRACT NUMBER:
WAYNE F SCHNEPPLE
TITLE:
SOLID STATE RADIAC
TOPIC# 173 OFFICE: NSWC IDENT#: 23858

THIS INNOVATION PROPOSES FEASIBILITY STUDIES LEADING TO THE DEVELOPMENT OF A FULLY PORTABLE AND SELF-CONTAINED UNDERWATER RADIAC INSTRUMENT CAPABLE OF CONCURRENT AND SEPARATE DETECTION, ANALYSIS, MEASUREMENT AND DISPLAY OF BOTH GAMMA AND NEUTRON RADIATION. THE UNIT WILL BE DESIGNED AS A SMALL, LIGHTWEIGHT, RUGGED, ONE-DIVER INSTRUMENT EMPLOYING SCINTILLATOR CRYSTALS TO CONVERT NUCLEAR RADIATION INTO UV/VISIBLE LIGHT PULSES. THE LIGHT PULSES WILL THEN BE ANALYZED AND MEASURED VIA A NEWLY DEVELOPED AND ADVANCED SOLID STATE AVALANCHE PHOTODETECTOR AND ANCILLIARY ELECTRONICS. TWO ELEMENTS ARE CONSIDERED KEY TO THE BASIC DESIGN CONCEPT. FIRST, IS THE USE OF TWO DIFFERENT SCINTILLATOR MATERIALS - SODIUM IODIDE, WHICH WILL SERVE AS THE PRIMARY, HIGH SENSITIVITY GAMMA DETECTOR AND ALOS AS AN ANTICOINCIDENCE SHIELD, AND GADOLINIUM ORTHOSILICATE FOR ITS THERMAL NEUTRON SENSITIVITY. THE SECOND KEY ELEMENT IS THE USE OF A NEWLY DEVELOPED, LARGE AREA (TO CENTIMETERS IN DIAMETER), HIGH GAIN, SILICON AVALANCHE PHOTODIODE (APD) AS THE LIGHT DETECTOR. THE MORE RUGGED SOLID STATE APD HAS A SMALLER VOLUME, BUT THE SAME SENSITIVE

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DETECTION AREA AS THE PHOTOMULTIPLIER TUBE NORMALLY USED FOR SCINTILLATOR APPLICATIONS.

ZEGER-ABRAMS INC
1112 CLARK RD
PHILADELPHIA, PA 19118
CONTRACT NUMBER:
BURTON S ABRAMS
TITLE:
INVESTIGATION OF OWN TRANSMISSION CANCELLATION FOR CONTINUOUS FREQUENCY MODULATION SONARS
TOPIC# 123 OFFICE: NAVSEA IDENT#: 24954

A DESIGN STUDY AND FEASIBILITY MODEL IMPLEMENTATION OF AN ADAPTIVE INTERFERENCE CANCELER IS PROPOSED FOR APPLICATION TO LONG RANGE SONAR SYSTEMS USING CONTINUOUS FREQUENCY MODULATION. THE PURPOSE OF THE CANCELER IS TO PREVENT OVER-LOAD OF THE SONAR RECEIVER DYNAMIC RANGE THAT WOULD OTHERWISE RESULT FROM HIGH POWER COUPLING OF THE TRANSMITTED SIGNAL INTO ITS INPUT. ADAPTIVE INTERFERENCE CANCELER TECHNIQUES THAT HAVE BEEN SUCCESSFULLY USED PREVIOUSLY WITH RADIO SYSTEMS ARE MODIFIED FOR APPLICATION TO THE SONAR PROBLEM.

ZEMANY H C
27 PULPIT RUN
AMHERST, NH 03031
CONTRACT NUMBER:
DR PAUL D ZEMANY
TITLE:
DOMAIN ORIENTED ARCHITECTURE AND PROGRAMMING PARADIGM FOR REDUCED SOFTWARE DEVELOPMENT
TOPIC# 140 OFFICE: NSWC IDENT#: 23610

SOFTWARE DEVELOPMENT IS BECOMING A MAJOR COST IN TODAY'S MILITARY WEAPON SYSTEMS. TO ADDRESS THIS PROBLEM, THE PROPOSED APPROACH EMPLOYS A "VIRTUAL" DOMAIN ORIENTED ARCHITECTURE, AN INTERACTIVE EDITOR, AND A LIBRARY OF "INTELLIGENT" MODULES. THE INTELLIGENT MODULES HAVE A DUAL VIEWPOINT. FIRST, THEY ARE THE DOMAIN ORIENTED

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TRANSFORMATIONS WHICH FORM THE OP-CODES OF VIRTUAL ARCHITECTURE. THIS VIRTUAL ARCHITECTURE CONTAINS AN INFINITE SET OF TRANSFORMATION UNITS WHICH CAN COMMUNICATED IN AN ARBITRARY FASHION. SECOND, THE MODULES CONTAIN "SYNTHESIS INSTRUCTIONS AND CONSTRAINTS" WHICH DRIVE AN INTERACTIVE EDITOR DURING A "COMPOSITE" SYNETHESIS PROCESS. COMPOSITES PRODUCED BY THE SYNTHESIS PROCESS ALSO CONTAIN APPENDED INFORMATION FOR THE INTERACTIVE EDITOR. IN THIS FASHION, A HIERARCHIAL SOFTWARE STRUCTURE CAN BE DEVELOPED WITHOUT USING A HIGH LEVEL LANGUAGE. AFTER DEVELOPMENT OF THE SOFTWARE STRUCTURE (VIRTUAL ARCHITECTURE PROGRAM), CONSTRAINTS OF THE TARGET ARCHITECTURE CAN BE OVERLAID TO GENERATE THE TARGET PROCESSOR PROGRAM. THE PROPOSED APPROACH VIEWS DIGITAL SUBSYSTEMS AS OBJECTS HAVING TRANSFORMATION PROPERTIES. "SOFTWARE" REPRESENT HOW THESE TRANSFORMATION AGENTS ARE INTERFACED. PAST WORK IN ANALOG COMPUTERS IS RELATED TO THE PROPOSED CONCEPT.

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